Agriculture 4.0: Preparing for the future of Agribusiness

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What is Agriculture 4.0?

The pursuit of increased yields, lower costs, and reducing variability in farming has lead to technological leaps and bounds within agribusiness. As artificial intelligence (AI) eclipses traditional farming approaches, industry players making business decisions today must consider and anticipate shifting technological landscapes and the impacts of such changes on their future operations.

Farming and agriculture have long been at the forefront of innovation, especially with AI. Despite early promises of self-driving cars, road-worthy autonomous vehicles are still in their infancy though steady gains have occurred in machine learning, manufacturing, and sensor technology. While the rest of the world stands at the precipice of an autonomous revolution, the new paradigm "Agriculture 4.0" is well underway.[1]

AI systems in agriculture are already having an impact on how industry views the space above and below the topsoil. For example, MDA, a Maxar company and a global leader of space technology for commercial and government markets, recently partnered with Alberta Innovates and the Canadian Agri-Food Automation and Intelligence Network to advance AI applications in the agricultural sector.[2] In Saskatchewan, Precision AI recently raised $20 million to support its platform that uses a swarm of drones to provide precision farming through targeted herbicide application.[3] Market movements such as these make agriculture in Canada quite literally rocket science.

The relationship between AI and agriculture is born from necessity. Providing for our most basic food requirements is increasingly challenging with climate change and subsequent increases of drought, flood, frost, and other extreme weather events. In addition, Earth's growing population will reach nearly 10 billion by 2050, thereby significantly increasing food demand. Amidst this backdrop, AI systems attempt to solve the predictably unpredictable.

In our previous article "The Future of Agribusiness: integrating AI systems into traditional farming operations," we discussed the efficient integration of data partnerships and how licensing agreements can be used to share risk between parties. Here we take a deeper look at business considerations and contractual challenges of an

evolving agriculture industry that necessitates the use of such groundbreaking technology.

Business recalibration

Incorporating AI systems demands a renewed focus on business strategies and involves more than simply geo-fencing a field for autonomous navigation. Running just one AI system or piece of equipment requires start up time and capital with a forward thinking plan that goes well beyond the next planting season. Industry players must first ask “how” rather than “what” technologies should be used. Consider the current difficulties in implementing internet service in rural Canada, where just having the bandwidth alone to support new technology could be a significant first hurdle. Once internet and power supply is stable, follow-up considerations include data storage, security, encryption, and the availability and timeliness of technical support through both external communication and on-site visits. Parties should also be aware of hidden costs such as the need for computer upgrades, training, and fluctuating electricity bills.

There are tangible gains to be made through incorporating AI technology, and additional advantages can be achieved when a “business as usual” approach is avoided. Adapting to data being generated in real time is one shift occurring in the industry. A business that does not prepare itself to adjust to the data generated by AI systems is not using this technology to its full potential. Autonomous systems that analyze weather and soil patterns may present an opportunity to modify traditional crop rotations or reduce the need for irrigation or spraying. An effective program might also recommend changes to optimal planting or harvesting dates and directly influence what is being planted based on the real-time or predicted chemical composition in the soil. None of these advantages are possible if a business is unable to make decisions based on real time data and quickly substitute relevant assets or inventory.

Business efficiency is a moving target and AI represents a leap of faith for an industry that is deeply dependent on commercial certainty. AI adoption means changes to available capital, employment, transportation, and infrastructure within the agribusiness sector. When real time data suggests a different approach to comfortable routines and practices, a business must be prepared to quickly modify their operation to reap the benefits, lest the advantages of AI be lost.

Contracting for certainty

Canada currently does not have legislation explicitly addressing artificial intelligence, machine learning, or deep learning networks. The use and application of data generated by artificial intelligence is indirectly related to a legal framework concerning privacy, copyright, and patent law. With no regulatory body or agency guiding the use and development of AI, there are questions about the risks, complications, and liabilities that stem from the use of an automated machine or system. In this context, the words of a contract are critical.

Generally, the contract is the sole source of the legal obligations of the parties and the foundation for recourse should problems arise. Written agreements must be detailed enough to strictly define each party’s commitments amidst the subtleties of an automated program while also retaining flexibility to adapt to changing variables

inherent to technology and the agriculture industry. Contracts should predict and adapt to future changes in both law and agriculture so that parties do not make an agreement that might later be invalid or unwanted in light of new legislation or changing practices. For instance, the implementation of a precision farming practice could make a longstanding herbicide or pesticide agreement obsolete when only five per cent of a previous years supply is needed. A disadvantageous situation would envision double costs where a farmer has contracted to spend capital on assets no longer being used as a result of AI increased efficiency, as well as the costs of implementing the same AI systems that lead to those efficiencies in the first place. The same could be said for the purchase of large irrigation infrastructure and associated costs amidst the use of a technology that drastically reduces water needs, which is an important consideration given the rising occurrences of drought on the prairies.

Contracts must address abstract concepts related to how AI and deep learning actually functions and appropriately allocate the risk between the parties with respect to the AI systems. Parties should include quantifiable metrics to be used to evaluate the performance of AI systems, include representations and warranties relevant to the AI system, and include sufficient limitations on liability and indemnification provisions to mitigate risks. When drafting agreements, unique questions for negotiation will be raised such as the amount of training or learning required to guarantee an AI's performance under the terms of the contract and furthermore, which party is responsible for guaranteeing that an autonomous machine is adequately prepared for the work required. Other contractual obligations might relate to software or firmware updates and an assurance that updates do not occur during the midst of a critical harvesting time. More importantly, will these systems still function in the absence of such updates or will additional costs be incurred in a way that mimics the planned obsolescence of modern personal technology? By nature, both agriculture and AI quickly adjust to constantly changing variables. An effective contract must fully encapsulate these nuances to provide future certainty for the parties.

Conclusion

Agriculture has always been an early adopter of technology. Farmers have a long history of being "pioneers" in both the literal and technological sense and will continue to demand technology that can keep pace with their business. Contracts cannot remain boilerplate or standard in the context of AI. Baked into every agreement must be a trust and understanding between parties to ensure the safety and reliability of our food chain. The efficiency gains available through artificial intelligence in the world of agriculture demand cooperation between the technology, the creators, and the users to address the unique challenges and benefits that AI facilitates.

This article was originally published in Canadian Equipment Dealer magazine.

[1] See Agriculture 4.0 – Agricultural robotics and automated equipment for sustainable crop production |Policy Support and Governance| Food and Agriculture Organization of the United Nations (fao.org)

[2] MDA to Play Key Role in Government of Canada-funded Network to Advance Artificial Intelligence Technologies for Agriculture | Nasdaq

[3] Precision AI raises $20 million to reduce the chemical footprint of agriculture (newswire.ca)

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