FEEDING THE FUTURE WITH CANADIAN TECHNOLOGY

Briefing Note for Academia

The Opportunity: Advancing Canadian Ag-tech

As the global landscape of agriculture faces unprecedented challenges—from the impacts of climate change to the rise of disruptive technologies and cybersecurity threats—Canada's agri-food sector stands at a pivotal moment. The ability of our nation to not only adapt but to lead in this evolving context will require strategic investments that harness the power of agricultural technology (ag-tech).

For academic institutions, this moment presents a unique opportunity to drive innovation, forge stronger ties with industry, and contribute to the development of a sustainable, competitive, and resilient agri-food system.

Canada's unique position, with its vast arable land, diverse climate zones, and advanced farming practices, makes it an ideal leader in ag-tech innovation. However, to realize this potential, we must address critical barriers that hinder scaling, adoption, training, and recruitment in the sector.

Ag-tech could unlock up to $30 billion of economic opportunity for Canada.[1]

How can ag-tech support Canada's environment, economy and society?

Technologies like livestock feed additives, precision agriculture, and biodigesters are already showing promise in reducing greenhouse gas emissions.

Advanced sensing, imaging, and analytical techniques are improving our ability to measure and predict changes in soil carbon.

Robotics, automation, autonomous equipment, and artificial intelligence (AI) can all contribute to solving agri-food labour shortages.

Evolving AI-powered precision agriculture and controlled environment production technologies are making it possible to increase marketable output per acre, sparing land for biodiversity.

More efficient production coupled with technologies to improve logistics and reduce food waste can contribute to reducing food costs and improving global food security.

To harness the full potential of ag-tech and secure Canada's position as a global leader, we recommend academic institutions take the following strategic actions to support and capitalize on the growing opportunities in Canadian ag-tech.

1. Entrepreneurship education for all.

By embedding entrepreneurship education across all disciplines, universities and colleges can ensure that students are not only innovative thinkers but also capable of bringing their ideas to market. This comprehensive approach will prepare the next generation of leaders to tackle the complex challenges of the agri-food industry.

Entrepreneurship skills are vital to the future of ag-tech. Academic institutions should partner with governments and entrepreneurship support programs to develop educational programs that focus on patenting, intellectual property (IP) protection, and commercialization. Moreover, entrepreneurship training must pair these technical skills with the foundational human or "soft skills" (communication, decision making, emotional intelligence, etc.) needed to ensure that innovators are equipped to succeed in a rapidly evolving industry.

2. Address skills gaps with micro-credentials.

To keep pace with the rapid advancements in ag-tech, addressing skill gaps and retraining the current workforce is essential. Developing and delivering micro-credential programs through collaborations between agriculture, engineering, computer science, and business schools can play a crucial role in providing targeted education and training opportunities that align with industry needs, ensuring Canada's agri-food labour force remains competitive and adaptable.

Canada is projected to need 49,000 additional ag-tech workers within the next year.[2] While automation and technology provide a partial solution to mitigating labour shortages, workers also need skills and training to operate these technologies effectively.

Micro-credential programs will allow for flexible reskilling and highly specific training as an avenue to efficiently address labour shortages and skills gaps. These programs should be widely accessible and promoted to attract new talent and support those already in the industry.

3. Foster interdisciplinary connections.

Interdisciplinary collaboration must be at the forefront of academic education and research to fully realize the potential of ag-tech. Academic institutions should develop specialized interdisciplinary programming. The challenges facing the agri-food sector are multifaceted, requiring insights from various disciplines. Strengthening connections between agriculture and disciplines such as engineering, computer science, and environmental studies will enhance the development of innovative solutions for the sector's most pressing issues.

To provide graduates with the necessary skills, Canada must capitalize on the opportunity to build on our robust post-secondary ecosystem. Academic institutions should focus on: 1) creating new agri-food programming that brings together interdisciplinary groups, and 2) integrating entrepreneurship and business education into existing agri-food programming.

These programs should employ best practices in applied interdisciplinary learning, including case-based learning, problem identification, and group work. In turn, these programs will help empower diverse and talented individuals from all disciplines to work together to advance the social good and create long-term, world-changing innovation through agri-food.

4. Engage with industry.

Successful application of agri-food research hinges on understanding the market and industry realities. Academic institutions must adopt a collaborative approach that actively involves industry partners across research projects and educational programming. Academia-industry collaborations will be key to fostering innovation and commercialization within the agri-food sector. This engagement will facilitate a more seamless transition from research to industry implementation (i.e., on-farm application), accelerating the adoption of new technologies. This alignment is critical for translating academic contributions into tangible benefits for the agri-food sector.

Involving industry partners as advisors and partners within academic programs can provide valuable insights into market needs and help guide program development, ensuring that graduates have strong competencies to take up the challenges of a rapidly changing agriculture sector.

5. Mobilize applied research.

There is an adoption gap between applied research and commercial impact. One report suggests that only 40% of projects between multinational corporations and universities actually had an impact on the efficiency and competitiveness of the partner organizations.[3] Canada's ag-tech players have an opportunity to improve on this. Academia, the agriculture industry, and public extension networks need to strengthen and refine their systems of collaboration to ensure that research output leads to commercial viability at a higher rate and with a shorter timeline. Applied research projects need to have real-world impact, develop practical results, be designed with the end-user in mind, and show solid return on investment. It's important to recognize that we should not prioritize applied research commercialization potential at the expense of discovery research, which provides the essential foundation for applied research. We must ensure that overall research funding increases and that the value of all types of research is recognized and supported.

6. Raise awareness among youth and diverse communities.

The future of Canada's agri-food sector depends on the active engagement of youth and diverse communities. Academic institutions must play a key role in raising awareness of the vast opportunities available in ag-tech, fostering a new generation of innovators who will drive the sector forward.

Initiatives targeted at youth (K to 12) and at underrepresented groups are especially needed for the sector to avoid missing out on the diverse talent, experience, and ideas that will drive Canadian agri-food innovation and address projected labour shortages and skills gaps.

These initiatives must address complex considerations among underrepresented groups in the sector, including perceptions of agri-food as a viable career path, access to capital and financing, and recognition of foreign credentials. We encourage the continued development of financing and funding mechanisms that recognize these systemic barriers to bring new and necessary knowledge, skills, and talent to this industry.

Conclusion

Canada has the potential to lead the world in ag-tech innovations, but we need to act now to realize this potential. What we need most is a coordinated effort from all sectors working together to set goals and targets, while developing funding mechanisms that will accelerate Canada's agri-food innovation ecosystem.

> *To ensure Canada's leadership in agricultural technology, it is crucial to foster entrepreneurship and strengthen connections with industry as well as across sectors and disciplines. By adopting these recommendations, Canadian academic institutions can play a leading role in advancing agricultural technology, driving innovation, and securing the future of our agri-food sector.*

For more information:

Feeding the Future with Canadian Technology Final Report

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AT THE UNIVERSITY *of* GUELPH

UNIVERSITY OF THE FRASER VALLEY
FOOD AND AGRICULTURE INSTITUTE

References

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2   Ivus, M., et al. (2022). Overview: Canadian Agri-Food Technology. Information and Communications Technology Council (ICTC). https://ictc-ctic.ca/articles/overview-canadian-agri-food-technology

3   Pertuze, J. A., et al. (2010). Best practices for industry university collaboration. MIT Sloan Management Review.