PUBLISHED APRIL 2022

EVIDENCE BRIEF

The **Social Sciences and Humanities Research Council** in collaboration with the **Future Skills Centre**

SSHRC's Imagining Canada's Future initiative mobilizes social sciences and humanities research to address emerging economic, societal and knowledge needs for Canada, and help guide decision-making across all sectors toward a better future. This evidence brief addresses the Future Challenge Area of: **Skills and Work in the Digital Economy**

Digital technologies and the big data revolution in the Canadian agricultural sector: Opportunities, challenges and alternatives

About the project

Primary production agriculture is changing rapidly due to major developments in digital "smart" technologies. Smart farming is based on deploying remote sensing devices in agricultural equipment such as tractors, planters, sprayers and combines in the grain and oilseed industries, and in robotic milkers and ear tags in the dairy, beef, swine and poultry industries.

Smart devices in farm implements and other on-farm machinery create and provide a wide variety of "small data." While small data has some value on its own, the real value emerges with the creation of "big data." Big data is created when an agricultural technology provider (ATP) combines the data of many farmers with data from other sources (e.g., weather). This data can then be analyzed with proprietary algorithms to provide recommendations—e.g., the seed, fertilizer and chemical combinations to use on different land units—that can improve yields, environmental outcomes and/or economic return.

While data aggregation provides value, it also creates a set of problems and challenges, including concerns around privacy, security, data ownership, competition and market power, and the transformation of work, which together are manifested in a lack of trust by farmers in the technology.

We review the literature to examine the response in Canada and elsewhere by farmers, agribusiness firms, agricultural organizations and governments to the emergence of big data. Based on this review, we provide recommendations on what players in Canadian agriculture could be doing.

Key findings

Big ag data development has been very rapid and forms the basis of the strategic plans of the world's largest farm equipment manufacturers (e.g., John Deere), seed and chemical companies (e.g., Bayer, Syngenta) and information technology firms (e.g., Amazon, Google).

Farmers lack trust in the technology. Although they believe it can enhance efficiency, lower costs, increase yields, and improve management and decision-making, they are uncomfortable sharing data. Farmers worry about whether their data are secure and can be used without their knowledge. They are concerned about a lack of competition among ATPs, as well as whether big data will fundamentally change the nature of work on the farm. To alleviate these concerns and create confidence in big data, ATPs, along with farm organizations and, in some cases, government, have created voluntary codes of practice for the use and sharing of agricultural data.

The creation of voluntary codes has taken place in the United States, Australia, New Zealand and the European Union (EU). Voluntary codes have not yet been created in Canada.

The EU has introduced data portability rights to address concerns about both privacy and competition. However, these rights are applicable only to consumers and do not apply to farmers in their role as farm business owners.

Data portability is being pursued in Canada and is at the centre of the federal government's Digital Charter Implementation Act, 2020 (Bill C-11). This legislation has not passed; if it does, it will not apply to farmers as business owners. Although it is argued that data portability would increase competition, the economics of big ag data (e.g., large sunk costs, need for a large geographically dispersed group of data suppliers) suggest this is unlikely to occur.

In addition to data portability, discussion is occurring around data interoperability (the ability to access features of one service from another). This approach to increasing competition is not on the policy agenda.

An alternative (and potential complement) to both voluntary agreements and data portability is the creation of data cooperatives. Cooperatives have a long history in agriculture, dating back to the late 1800s. A key reason for their creation is their ability to enhance competition in agricultural input and output markets, and to increase farmers' trust in the system. Although there are a few examples, ag data cooperatives have received very little attention as a way of dealing with the challenges and concerns around big ag data.

Policy implications

The major players in Canadian agriculture should develop a voluntary code of practice for the use and sharing of agricultural data.

While a voluntary code will not solve competition and trust problems, it is a necessary first step.

Data portability, even if it were applied to farmers as business owners, is insufficient to address farmers' concerns around competition. Other mechanisms are required to address this issue.

Cooperatives should be actively investigated as a way of increasing competition and creating trust in big ag data.

The creation of ag data cooperatives will require the involvement of a wide group of actors, including researchers, co-op developers, farm leaders, existing farm organizations and businesses, and federal and provincial policy-makers.

Governments must balance their involvement in co-op development. While they must not be indifferent or hostile, they must also not try to exert undue control.

Co-op proponents will need to be attuned to the technological issues around big ag data, and they will need to pay attention to a social and legislative environment in which data sovereignty, security and privacy issues are changing rapidly.

CONTACT THE RESEARCHER

Murray Fulton, Professor, Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan; Murray.Fulton@usask.ca

Marc-André Pigeon, Assistant Professor and Director, Canadian Centre for the Study of Co-operatives, Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan; Marc-Andre.Pigeon@usask.ca

Yang Yang, Assistant Professor, Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan; Yang.Yang@usask.ca

Bill Oemichen, PhD Student, Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan; Bill.Oemichen@usask.ca

FURTHER INFORMATION

▷ **Read the full report**

This report was produced as part of a project funded by the Future Skills Centre (FSC), with financial support from the Government of Canada's Future Skills Program.

FSC is a forward-thinking centre for research and collaboration dedicated to preparing Canadians for employment success. We believe Canadians should feel confident about the skills they have to succeed in a changing workforce. As a pan-Canadian community, we are collaborating to rigorously identify, test, measure, and share innovative approaches to assessing and developing the skills Canadians need to thrive in the days and years ahead. The Future Skills Centre was founded by a consortium whose members are Toronto Metropolitan University, Blueprint ADE, and The Conference Board of Canada