



The use of digital agriculture by Ontario's small farmers: barriers and opportunities

Project Brief

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Study in Brief

This research project sheds light on small and diverse farmer engagement with emergent technologies, especially the technological benefits, needs, concerns, and limitations of digital agriculture for producers located in Eastern Ontario¹ and West Quebec. These farms, including market gardeners, organic farmers, agro-ecological, and regenerative farmers, tend to be smaller-scale and more biodiverse than large commodity farms of mid-western Canada and we know that such farms play a crucial role in food system sustainability. However, farmers in this region demonstrate a low level of adoption and use of digital technologies compared to their counterparts in the mid-west. We surveyed approximately 115 producers representing both conventional and alternative farm practices and made 12 farm visits to interview those who are engaged with emergent digital technologies. Importantly, the study assessed barriers and opportunities for smaller farms when it comes to digital tools, and the results begin to clarify some of the reasons for non-adoption; for example, we highlight limitations or gaps in commercially available technologies whose features are less relevant to farms of this scale. We also highlight a lack of drivers for adoption coming from the policy context in Ontario. The results of the study are of relevance to policy analysts, policymakers, as well as technology developers wishing to craft more inclusive tools for diverse agri-food systems.

1. Eastern Ontario includes the wedge-shaped area between the Ottawa and St. Lawrence Rivers beginning east of the City of Kingston.



Key Findings

In the survey, 48% of farmers (especially those under the age of 54) defined digital agriculture (DA) positively with 39% of farmers defining DA neutrally (especially those over the age of 55). About 12 percent of participants defined DA negatively.

Marketing was noted as the top advantage of digital technologies, regardless of farm type or size². Interestingly, over a quarter of women respondents compared with 17% of men mentioned 'online marketing' in their definition and advantage of DA technologies. Indeed, a majority of small-scale and alternative farmers said that older information and communication technologies used off the farm (i.e., not for production) were very helpful in establishing and maintaining access to markets and relationships with consumers. Additional benefits were seen to relate to employee management and bureaucratic matters such as achieving organic certification.

“[I define digital agriculture as] any use of digital/computerized technology to make a farm or the work on a farm more efficient” - Survey participant

Small-scale farms (18%) were twice as likely as large scale farms (9%) to talk about price and affordability as barriers in relation to adoption of digital tools.

“[The benefit of DA is] selling online - so I can focus on growing!” - Survey participant

Farm visit discussions with small-scale and alternative farmers indicate that automation technology is not as useful or viable in their context. Farming is seen as more of a lifestyle choice, including people-focused production, rather than a business; moreover, tasks

are not as repetitive given the lack of standardization (biodiversity). While digital tools such as automation/robotics, big data platforms and sensing machinery may be useful, they are currently unaffordable for smaller-scale operations.

“There have been a lot of attempts to develop software but they usually miss the mark on usability or are cost prohibitive” - Survey participant

2. Survey participants represented conventional, organic, regenerative, agroecology and market gardening enterprises. Small-scale farms were defined at under 10 acres and large-scale farms were defined at over 100 acres.



In contrast to other research, privacy issues related to DA data use and governance did not appear to be of concern among participants and it did not appear to be a barrier to the adoption of digital tools. Indeed, some participants indicated that they are more than willing to “share data widely,” especially with other farmers of their scale and type.

Relevance for Decision-Makers

Governments are making significant investments in the digital transition of agriculture hoping that new innovations will help us address grand challenges such as food security, climate change mitigation and adaptation, and supporting profitability and sustainability on farms.

This study highlights issues for both public and private sector decision-makers to consider in support of DA investments that could best serve small scale farmers and more biodiverse and labour-intensive agricultural practices. For example: Tools that help farmers access markets are as or more useful than digital tools for production. Tools foremost need to be affordable and useful; and it appears that automation and robotics in particular are currently not of interest to small farms. One issue for future exploration is that almost every farmer in Ontario mentioned a lack of provincial supports for small-scale and biodiverse agriculture in contrast to farmers in Quebec who reported choosing the province of Quebec to locate their farm precisely because of government support for innovation among small-scale farmers. An additional issue for future exploration is how agricultural technology intersects with other equity issues, including the experiences of women farmers: Our research uncovered a secondary finding that female farmers are statistically over-represented among market gardeners in Ontario compared to conventional farmers. As such, supporting this scale of farm innovation in Ontario is a matter of gender equity.

Visit the [Diversity by Design](#) website for more information on this project and other initiatives lead by the Science & Society Collective.