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FROM FRAGMENTED PROGRAMS TO A DIGITAL FRAMEWORK: RETHINKING CANADA'S AGRICULTURE POLICY

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FROM FRAGMENTED PROGRAMS TO A DIGITAL FRAMEWORK: RETHINKING CANADA'S AGRICULTURE POLICY

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EXECUTIVE SUMMARY

Between 1961 and 2020, global agricultural output quadrupled while population grew by 260%, largely driven by technological adoption rather than land or labour expansion. Yet growth has slowed in recent decades, productivity is under pressure, and over 2 billion people remain food insecure. With climate change, resource degradation, and rising input costs compounding these challenges, conventional technologies alone are no longer sufficient. Global institutions now view digital transformation as essential for feeding nearly 10 billion people by 2050 while meeting sustainability and poverty reduction goals.

GLOBAL TRENDS IN AGRICULTURAL DIGITALIZATION

A scan of 22 jurisdictions shows that **13 already have explicit digital agriculture strategies**. While all countries recognize innovation, connectivity, and sustainability as shared priorities, their approaches diverge in ambition and coherence:

- **Systemic transformation (India, China, EU, Japan):** Agriculture is embedded within national digital economy and modernization strategies. Large-scale public platforms (e.g., India's *Agristack*, China's *Smart Agriculture Action Plan*, the EU's *Common Agricultural Data Space*) create the digital backbone for services, farmer support, and sustainability goals.
- **Structured, balanced approaches (Canada, Australia, EU):** Digitalization is treated as an enabler within broader agricultural or sustainability strategies. Programs target innovation, competitiveness, and climate resilience, but progress is incremental and fragmented.
- **Adoption-focused models (Australia, Brazil, South Korea):** Direct incentives, cost-sharing, and hub networks aim to accelerate farmer uptake, especially among small and medium producers.
- **Hub and partnership ecosystems (Canada, Germany, Brazil, New Zealand):** Living labs, accelerators, and public-private partnerships provide testbeds and commercialization pathways, though coherence varies.
- **Data governance leadership (EU, India, Australia):** Strong frameworks define data rights, standards, and interoperability, giving farmers confidence and building trusted ecosystems.

Canada compares well in terms of **research capacity, innovation networks, and PPPs**, but lags peers in three areas:

1. **Systems-level vision** — Canada's policies remain siloed programs, lacking the integrated frameworks seen in India, China, or the EU.
2. **Farmer-centric data governance** — Current approaches rely on voluntary or piecemeal standards, while global leaders legislate clear rights, interoperability, and sovereignty.
3. **On-farm adoption support** — Programs exist but lack the simplicity, scale, and farmer-facing design of Australia's rebates or EU cooperative cost-sharing models.

RECOMMENDATIONS FOR CANADA

Drawing lessons from leading jurisdictions, Canada should shift from incremental programming to a coordinated, systems-based digital agriculture strategy that positions digitalization as central to economic competitiveness, sustainability, and rural vitality. Priority actions:

1. Prioritize Innovation

- Expand *Living Labs* into regional digital hubs and establish a **Canada Agri-Food Innovation Centre** to coordinate networks, scale solutions, and align funding.
- Invest in rural broadband and next-generation connectivity as agricultural infrastructure.
- Boost venture financing and challenge funds for ag-tech startups in climate-smart farming, automation, and farmer-facing tools.

2. Foster Inclusivity

- Invest in rural broadband and 5G to enable precision and smart farming.
- Establish **federal data standards** ensuring interoperability and farmer data sovereignty.

3. Promote Sustainability

- Align digital tools with climate and biodiversity goals.
- Scale programs that **reward measurable sustainability outcomes** (e.g., water efficiency, soil conservation) achieved through digital tools.

4. Adopt System-Based Policy

- Replace fragmented programs with an integrated, long-term National Digital Agriculture Strategy linking innovation, sustainability, and rural development.

Canada is well positioned to lead in digital agriculture but risks falling behind global frontrunners without a coherent, farmer-centric, and systems-based strategy. By aligning innovation, inclusivity, and sustainability, Canada can ensure digital agriculture is not just a technological shift but a transformative enabler of competitiveness, resilience, and food security for decades ahead.

NEW LANDSCAPE, NEW APPROACHES

Between 1961 and 2020, global agricultural output quadrupled while population grew by 260 per cent, driven primarily by technological adoption rather than land or labour expansion.

However, growth has slowed in recent decades, productivity is under pressure, and over 2 billion people remain food insecure. By 2050, agriculture will need to feed 10 billion people globally. With climate change, resource degradation, and rising input costs compounding these challenges, conventional technologies alone are no longer sufficient (Fuglie, Morgan & Jelliffe 2024; World Bank Group 2025a).

Given these challenges, the World Economic Forum argues that agriculture needs digital transformation, with greater focus on developing and upgrading agricultural data-collection systems, collaboration across stakeholders and regions, and explicitly identifying the potential of specific digital agricultural technologies to create a more sustainable agriculture future (Napier, Ishaque & Lhermie 2024; Lim 2022).

Against this backdrop, the Simpson Centre conducted a detailed survey of agricultural-digitalization initiatives among Canada's leading international peers. The resulting data – see www.digitalagpolicies.ca for full details – offers open access to comprehensive and periodically updated information on the policy frameworks guiding digital agriculture in these jurisdictions.

This report synthesizes the principal insights derived from the survey to date.

CURRENT GLOBAL TRENDS IN AGRICULTURAL DIGITALIZATION

Of the 22 jurisdictions in our scan, 13 had dedicated digitalization of agriculture policies in place. The remaining nine cover digitalization of agriculture in some form. There are various policy instruments being used, in these countries, to pursue greater digitalization of agriculture ranging from subsidies and protection to research spending and infrastructure development and regulatory support (OECD 2024; FAO 2024).

FORWARD-LOOKING POLICIES

Most agricultural digitalization strategies focus on three shared priorities: embedding advanced technologies into farming systems, expanding digital infrastructure and connectivity, and linking agriculture to broader sustainability and economic objectives. Across all regions, innovation, connectivity, and sustainability are recurring themes. Technologies include AI, blockchain traceability, drones, web and SMS notifications, GIS (McKinsey & Company 2020; World Bank Group 2025b).

Technical Hubs

Agri-innovation hubs are designed to accelerate agricultural digitalization by bringing producers, researchers, students, and AgTech firms together as “living laboratories.” Hubs trial technologies in real farming conditions, providing producers with early access to emerging tools, and offering innovators the opportunity to validate and scale their solutions (AAFC 2023; ISED 2017).

Public and Private Partnerships (PPPs)

PPPs have become a defining feature of agricultural digitalization, enabling governments, industry, and research institutions to pool resources, de-risk innovation, and accelerate the development and adoption of new technologies. These collaborations function as bridges between public policy objectives and private-sector agility, often providing the scale and flexibility needed to bring digital solutions from pilot to widespread application (CAAIN 2025; Protein Industries Canada 2025; Bioenterprise 2025).

Education and Training

This may take the form of business-led innovation initiatives to drive technological advancement and collaboration, cost-sharing support to farmers and agri-food businesses to access skills development training, and focused support

to disseminate skills, tools, awareness, and adoption of digital agriculture techniques (AAFC 2024a; Government of Canada 2024).

Data Sharing and Data Security

Agricultural data governance has become a central policy priority worldwide, as governments recognize that data systems are essential to enabling digital agriculture. Approaches range from regulatory frameworks and certification schemes to technical platforms that facilitate secure exchange and interoperability of data (European Parliament and Council 2023; AgriDataSpace 2025; Genome Canada 2025).

Innovation Policies

Such policies and networks are central to agricultural digitalization, connecting research, industry, and entrepreneurs to scale new technologies and business models. They promote the development of novel tools and also create pathways for commercialization, financing, and adoption. Many governments have established innovation clusters, research programs, and partnerships to catalyze technological change (ISED 2017; CFIN 2025; CAAIN 2025).

Supporting Digital Technology Uptake

Governments worldwide are developing programs to accelerate the uptake of digital technologies among farmers by combining direct subsidies and cost-sharing schemes with broader investments in infrastructure, literacy, and research. These initiatives recognize that innovation alone is not enough—policy must reduce the barriers of affordability, capacity, and trust that prevent producers from adopting digital tools (AAFC 2024a; Government of Canada 2024).

Systems Versus Programs-Based Approach

Agriculture may be conceived of an industry with farms as factories, or as an organism comprising multiple, complex interrelated sub-organisms. The latter systems-based approach tends to be more holistic, focusing on knowledge-based development of entire farms and communities while also addressing the environmental, economic, and social challenges of agricultural sustainability. Table 1 summarizes the approaches to digital agriculture being used in different regions (Kirschenmann 1991; Ikerd 1993; OECD 2024).

Table 1. International Approaches to Digital Agriculture

Approach	Countries	Features
Systems-wide transformation	India, China, EU, Japan	Digital agriculture is embedded in national modernization and sustainability strategies (e.g., Agristack, EU Agri Data Space).
Balanced/structured	Canada, Australia	Digitalization treated as part of broader sustainability and innovation programs, but without a national framework.
Adoption-focused	Brazil, South Korea	Direct subsidies, credit incentives, cooperative cost-sharing to drive adoption.
Hub & partnership ecosystems	Canada, Germany, Brazil, New Zealand	Living labs, accelerators, and public–private partnerships foster experimentation and learning.
Data governance leadership	EU, India, Australia	Strong legal frameworks for farmer rights, interoperability, and sovereignty over agricultural data.

CANADA IN CONTEXT

Canada has no explicit digital agriculture policy. However, programs such as Sustainable Canadian Agricultural Partnership (SCAP), Sustainable Agriculture Strategy (SAS), and Innovation and Skills Plan have digitalization of

agriculture built into their frameworks. The Guelph Statement, meanwhile, promotes the adoption of new technologies, better data use, extension services, and knowledge (Government of Canada 2021; OECD 2024).

However, when compared to the expansive strategies of Asia's major economies, Canada's incremental and programmatic model risks appearing cautious.

Data

SAS explicitly aims to improve measurement systems, integrate environmental and economic data at the farm level, and strengthen peer-to-peer data networks for knowledge transfer. More recently, Genome Canada's Climate-Smart Agriculture and Food Systems initiative established a Data Coordination and Collaboration Hub, to advance standards for data sharing, governance, and privacy in agriculture (Government of Canada 2023b; Genome Canada 2025). Still, **Canada's data framework is still evolving toward interoperability and national coordination.**

Innovation:

A combination of federal policy and industry-led clusters support innovation. For example, the Innovation and Skills Plan promotes business-led superclusters and increases venture capital access for entrepreneurs, while the Canadian Agri-Food Automation and Intelligence Network (CAAIN), – funded through the federal Strategic Innovation Fund – supports automation, robotics, and data-driven agriculture by providing testbeds for emerging technologies (ISED 2017; CAAIN 2025; CFIN 2025). These initiatives illustrate a layered approach, where **federal funding underpins industry-led innovation networks** that advance digital agriculture and food-tech development.

Support for uptake

This is delivered through a mix of national programs and provincial initiatives. For example, the Federal Sustainable Development Strategy encourages adoption of precision agriculture and clean technologies, while the AgriInnovate Program under the Sustainable Canadian Agricultural Partnership (SCAP) provides repayable contributions to commercialize and adopt innovative technologies. The Agricultural Clean Technology (ACT) Program offers cost-shared contributions of up to \$2 million for projects that cut GHG, fertilizer, and methane emissions through new equipment (AAFC 2024a; Government of Canada 2024; Government of Canada 2025b).

Figure 1 illustrates how jurisdictions differ in their approaches to adoption of digital agriculture. Canada, in comparison with other countries, sits in the **programmatic-moderate adoption quadrant**, reflecting its strong research and partnership networks but fragmented policies and limited farmer-facing incentives. In contrast, leaders such as the **EU, India, and China** occupy the **systemic-strong adoption quadrant**, where digital agriculture is embedded within national modernization strategies and supported by robust adoption measures (OECD 2024; FAO 2024). This positioning highlights Canada's opportunity to move from incremental programs to a coherent, systems-based strategy that empowers farmers and scales adoption.

Systems

While Canada fares well on various metrics against its peers, it falls short on adopting a systems-based approach to agriculture digitalization. Rather, **Canada has many piecemeal, siloed programs focused on agriculture digitalization.**

Innovation

The Innovation and Skills Plan teaches digital and coding skills to children, supports business-led innovation superclusters to drive technological advancement and collaboration, and increases access to venture capital for Canadian entrepreneurs. The Sustainable CAP program provides cost-sharing support to farmers and agri-food businesses to access skills development training on various issues, including digital technologies. Many Canadian universities, such as Olds College, University of Guelph, and University of Saskatchewan have academic agricultural programs and host world-class agricultural research centres.

This hub model is expressed through both national and regional networks. At the national level, organizations such as the Canadian Agri-Food Automation & Intelligence Network (CAAIN), the Canadian Food Innovation Network

(CFIN), Protein Industries Canada (PIC), and Bioenterprise Canada anchor a broader innovation ecosystem by linking startups, researchers, and industry partners across the country to accelerate digital agriculture solutions (CAAIN 2025; Olds College 2025; AAFC 2023).

These national platforms are complemented by a growing set of regional accelerators and cluster organizations, including Zone AgTech (QC), EMILI (MB), Ag-West Bio (SK), the AgTech Accelerator (SK), CDL-Rockies Agrifood Stream (AB), and the PEI Bio Alliance (PEI)—which provide local testbeds and build strong, place-based ecosystems.

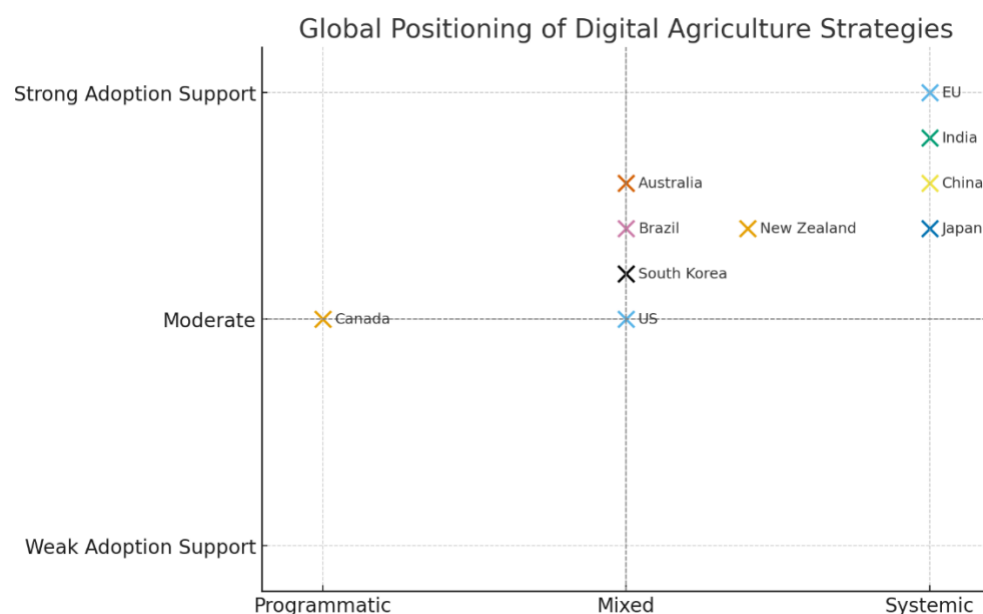


Figure 1. Digital ag policy approaches and adoption support

Note: Authors' assessment

PPPs

PPPs are well established across the agri-food innovation ecosystem. For example, CAAIN links federal government agencies, academic institutions, and private firms to drive digital agriculture. The Olds College Smart Farm functions as a living laboratory where public and private partners test and validate new tools in real-world production conditions (CAAIN 2025; Olds College 2025; AAFC 2023). At federal and provincial levels, governments continue to co-invest with research bodies and private companies in projects designed to accelerate digital agriculture adoption.

CANADA SUMMARY

Canada compares well in terms of research capacity, innovation networks, and PPPs, but lags global peers in three areas:

- **Systems-level vision** — Policies remain siloed programs, lacking the integrated frameworks seen in India, China, or the EU.
- **Farmer-centric data governance** — Current approaches rely on voluntary or piecemeal standards, while global leaders legislate clear rights, interoperability, and sovereignty.
- **On-farm adoption support** — Programs exist but lack the simplicity, scale, and farmer-facing design of Australia's rebates or EU cooperative cost-sharing models.

RECOMMENDATIONS FOR CANADA

The lessons from multiple leading jurisdictions are that **Canada should shift from incremental programming to a coordinated, systems-based digital agriculture strategy** that positions digitalization as central to economic competitiveness, sustainability, and rural vitality (ISED 2018). Priority action includes:

Prioritize Innovation

- Expand Living Labs into regional digital hubs and establish a Canada Agri-Food Innovation Centre to coordinate networks, scale solutions, and align funding.
- Boost venture financing and challenge funds for ag-tech startups in climate-smart farming, automation, and farmer-facing tools.
- Expand support for ag-tech startups and innovation clusters through challenge funds, sandbox environments, and targeted venture financing. Public funding should prioritize scalable solutions in climate-smart farming, remote sensing, automation, and farmer-centric data tools.

Develop Digital and Data Infrastructure

- Invest in robust rural broadband and next-generation connectivity (e.g. 5G) to enable widespread adoption of precision agriculture, remote monitoring, smart irrigation, and farm management systems.
- A national rural connectivity plan should prioritize under-served regions and tie directly to agricultural development.
- Ensure interoperability and data standards by introducing a federal framework for agricultural data governance that mandates open standards, promotes interoperability, and protects data sovereignty.

Foster Inclusivity

- Launch national digital skills and training programs for farmers, advisors, and agri-entrepreneurs, embedded in existing extension services and delivered via mobile/multilingual platforms.
- Create a federal agricultural data framework mandating interoperability, open standards, and farmer sovereignty over data.
- Structure PPPs with transparency and safeguards for inclusive design, especially for Indigenous, young, and underrepresented farmers.
- Expand programs like the Indigenous Agriculture Food Systems Initiative and the Local Food Infrastructure Fund to better target and support farms operated by underrepresented groups.
- Implement programs that provide mentorship, tax incentives, and financial support to young and new farmers to mitigate population loss in rural farms and to increase the adoption of digital agriculture tools and technologies in farms.

Promote Sustainability

- Explicitly align digital agriculture initiatives with Canada's climate and biodiversity strategies, expanding use of precision tools for emissions reduction and resource efficiency.
- Develop a National Bioeconomy Strategy linking sustainability labels, traceability, and certification to digital platforms for Canadian agri-food exports.
- Scale programs that reward measurable sustainability outcomes (e.g., water efficiency, soil conservation) achieved through digital tools.

Adopt system-based policy

- Shift from a fragmented, programmatic model to a holistic systems approach that connects digital agriculture with broader goals like rural development, food security, environmental protection, and innovation.
- Develop a long-term National Digital Agriculture Strategy to guide investment, coordination, and innovation across the sector, aligning with climate targets and sustainability goals.

Canada is well positioned to lead in digital agriculture but risks falling behind global frontrunners without a coherent, farmer-centric, and systems-based strategy (Napier, Ishaque & Lhermie 2024; OECD 2024). By aligning innovation, inclusivity, and sustainability, Canada can ensure its agriculture sector remains globally competitive and resilient.

CONCLUSION

One key stumbling block for the digitalization of agriculture is that stakeholders across the spectrum often have no relevant agricultural experience and underestimate the complexity. Farmers and ag-tech firms have also highlighted the lack of interoperability among ag-tech systems as an obstacle for greater ag-tech adoption.

Making global food value chains resilient against climate change, land degradation, deforestation and biodiversity loss requires cohesive, adaptable and ongoing relations between regional, national and international stakeholders. It is a challenge that can be addressed only with the concerted collaboration of farmers, business, academic research, and government.

In such a way, Canada develops a coordinated, future-ready approach to digital agriculture, prioritizing innovation, inclusivity, sustainability, and system-level transformation to ensure a smooth transition toward digital agriculture.

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