Vol. 13 No. 1, pp. 109–130 April 2026

Canadian Food Studies La Revue canadienne des études sur l'alimentation

Research Article

Financing sustainable food transitions: Mapping the investment ecosystem in Nova Scotia

Phoebe Stephens[a*] and Vicki Madziak[b]

[a] Dalhousie University; ORCID: 0000-0001-7538-1264
[b] Halifax Regional Municipality

Abstract

This paper examines how finance shapes sustainability transitions in food and agriculture, using Nova Scotia as a case study. While the role of finance is increasingly recognized in sustainability transitions scholarship, there is relatively little empirical work exploring how financial actors and instruments influence the directionality of agrifood system change. Drawing on semi-structured interviews with funders, investors, government officials, and food and agriculture entrepreneurs, as well as document analysis, the study maps the province's financing ecosystem and assesses how different types of capital support or constrain sustainability pathways. The findings reveal significant gaps in the availability, scale, and type of finance, particularly the need for patient, long-term capital. The paper argues that mission-oriented innovation approaches, including emerging work on mission-oriented agricultural innovation systems (MAIS), offer a useful framework for bringing greater coherence to sustainability efforts.

Keywords: Finance; Nova Scotia; sustainable food systems; sustainability transitions

*Corresponding author: phoebe.stephens@dal.ca

DOI: 10.15353/cfs-rcea.v13i1.741
ISSN: 2292-3071

Résumé

Cet article analyse la manière dont la finance façonne les transitions vers la durabilité dans les domaines de l'alimentation et de l'agriculture par une étude du cas de la Nouvelle-Écosse. Si la recherche reconnaît de plus en plus le rôle de la finance dans les transitions vers la durabilité, il existe relativement peu de travaux empiriques qui montrent comment les acteurs et les instruments de la finance influencent l'orientation des changements dans le système agroalimentaire. Sur la base d'entretiens semi-structurés avec des bailleurs de fonds, des investisseurs, des représentants gouvernementaux et des entrepreneurs agroalimentaires, ainsi que d'analyses documentaires, cette étude cartographie l'écosystème de financement de la province, et évalue comment divers types de capitaux soutiennent ou limitent les voies vers la durabilité. Les résultats révèlent des lacunes considérables dans la disponibilité, l'ampleur et le type de financement, particulièrement pour ce qui est du besoin de capitaux patients, à long terme. L'article soutient que les approches d'innovation axée sur la mission, incluant les travaux émergents sur les systèmes d'innovation axée sur la mission en agriculture, offrent un cadre utile pour apporter une plus grande cohérence aux efforts en faveur de la durabilité

Introduction

Sustainable food system transitions are critical for improving social and ecological outcomes, but there are competing visions for how this should unfold. For instance, some subscribe to an eco-modernist approach emphasizing innovations in digital technologies, while others prioritize low-tech approaches rooted in social justice and principles of agroecology (Anderson & Maughan, 2021). In addition to vision, sustainability transitions require capital (Havemann et al., 2020). The International Food Policy Research Institute estimates that U.S.$350 billion per year will be needed globally over the next five years for food systems to meet climate mitigation and adaptation targets as well as other UN Sustainable Development Goals (SDGs) ("Finance for Food Systems Transformation," 2023). Finance, of course, is not neutral: the availability and type of finance shape not only the pace but also the sustainability pathway or "directionality" of food systems. However, finance's influence on directionality often goes unnoticed amongst scholars and practitioners interested in systemic change (Mazzucato & Semieniuk, 2018). This study helps fill this gap by empirically examining how public, private, and non-profit actors invest in sustainable food systems, using Nova Scotia as a case study. Nova Scotia was selected as the case study because it illustrates how financing challenges and opportunities play out in small, mixed rural–urban economies with a strong agricultural base. Although Nova Scotia has unique characteristics, these findings are also relevant for other jurisdictions working to steer their food systems in a more sustainable direction.

While the need for sustainability investments is recognized globally, regional food systems face distinct financial and structural challenges. In Nova Scotia, these challenges are pressing on several fronts. Farms are facing declining profitability and net farm income has

consistently been negative over the last five years (Government of Canada, 2021a). Nova Scotia is losing farms and farm operators at an unsustainable rate; the province lost 21% of its farms between 2016 and 2021 alone (Government of Canada, 2012a). These farm losses are attributed to industry consolidation and declines in total farm acreage. Between 2011 and 2021, farm acreage in Nova Scotia declined by 29% (Government of Canada, 2012b). The rising cost of farmland is another significant barrier, as it has been steadily increasing over the last decade (Government of Canada, 2021b). Meanwhile, agriculture continues to receive a declining portion of the provincial budget and many banks have closed rural branches, effectively cutting off a key piece of infrastructure that was providing capital to entrepreneurs in the food system (Crossman,2023).

Climate change poses additional significant risks to the area. Nova Scotia is amongst the provinces that are predicted to be exposed to the highest rates of sea level rise in Canada by 2100, leaving vital regions, such as the Chignecto Isthmus, the only road and rail connecting Nova Scotia to the rest of Canada, at risk (Wade, 2022). If this connection were to be lost, Nova Scotians' access to food would be significantly challenged. Such a disruption could be catastrophic, as almost one third of Nova Scotians are already experiencing food insecurity (Cruz, 2024).

Rising levels of diet-associated chronic disease are also straining the overstretched healthcare system, which in 2024 accounted for 44% of the province's total budget (representing an increase of 36% compared to spending over the three previous years) (Canadian Press 2024). Despite this large investment of resources, the healthcare system is "in shambles", characterized by high levels of physician burn out, chronic shortage of nurses and historically long wait times (Barua and Whalen, 2023). Food and healthcare issues are not isolated, and experts maintain that increasing access to healthy local food will ease the burden of disease on the healthcare system (Rideout et al., 2015).

From a geopolitical perspective, recent economic threats associated with tariffs on agricultural products to and from the United States have added a new layer of vulnerability for the province (Hursh, 2025). Together these factors highlight the need for the province to transition to a more resilient and sustainable food system.

Despite these challenges, Nova Scotia has a vibrant local food sector, including the highest per capita number of farmers' markets in the country and a growing number of community-based food initiatives (Mughees, 2025). These dynamics make Nova Scotia an instructive case for exploring how financial mechanisms influence sustainable food transitions in regions characterized by structural vulnerabilities and strong local engagement.

In recent years, several funds and programs have developed to channel capital into Nova Scotia's food and agriculture sector to boost sustainability and resilience. The case study of Nova Scotia's sustainable food and agriculture financing ecosystem helps to contextualize sustainability transition theory and policy. Rather than adopting or endorsing a single definition of sustainability, this paper examines how different actors in Nova Scotia's food financing landscape interpret and operationalize the concept to illuminate the implications for the future of food for the province. Following scholars such as Leach et al. (2010), sustainability here is treated as a contested and evolving idea.

Role of finance in sustainability transitions

This paper engages with the interdisciplinary field of sustainability transitions which explores processes of large-scale systemic change towards more sustainable social, economic, and technological systems (Geels, 2010; Loorbach & Huffenreuter, 2013; Smith et al., 2010). Sustainability transitions scholarship focusses on the role of innovation, policy, and multi-level interactions between actors and institutions to shift away from unsustainable practices, emphasizing long-term structural transformations. It classifies finance as an essential resource and function within innovation systems for enabling long-term systems change (Farla et al., 2012). While sustainability transitions scholarship emphasizes the multiple pathways innovations can take, and the ways in which policies can influence sub-optimal outcomes or even lock-in, it has tended to ignore the how public and private finance influence the directionality of sustainability transitions to achieve societal missions (Mazzucato and Semieniuk, 2018).

However, aligning finance with positive social and environmental outcomes has a long history, with roots tracing back to the Quakers in the late 18th century when members prohibited participation in the slave trade (Reeder & Colantino, 2013). In Canada, early experiments in socially oriented finance include the Antigonish Movement of the 1930s and the work of Alphonse Desjardins in the early 1900s (Torgerson et al., 1998). The Antigonish Movement, rooted in Nova Scotia, combined adult education, co-operative development, and community organizing to address widespread rural poverty (Coady Institute, 2018). These Canadian initiatives laid important groundwork for today's socially and environmentally oriented investing.

Researchers have begun to explore how different types of financial actors influence the technologies and sectors that they are financing (Mazzucato & Semieniuk, 2018; Stephens, 2021). For instance, the role of public sector financing in creating new sectors like information and low carbon technologies has started to garner research interest (Mazzucato, 2013). As well, studies have considered the ways in which private banks invest in particular sectors like chemicals and agriculture (Mazzucato & Wray, 2015). Scholars have also explored how venture capital favours particular types of investments and sectors like IT and biotech, and more recently, agritech (Marquis, 2024). This work highlights something that is intuitively recognized but often only vaguely understood: the type of finance shapes which innovations are prioritized, and in turn, influences the direction of innovation processes such as sustainability transitions. As well, finance can take a variety of forms, which are in turn dependent on institutions and infrastructure (Mazzucato & Semieniuk, 2018; Steffen & Schmidt, 2021).

Recent work has called for more deliberate alignment between financial systems and sustainability goals through what Mazzucato (2018) describes as mission-oriented innovation policy (MIS). Applied to food systems, this approach has evolved into the idea of mission-oriented agricultural innovation systems (MAIS), which emphasize coordinated, cross-sectoral investment toward shared sustainability objectives (Klerkx & Begeman, 2020; Kok & Klerkx, 2023). While the literature on MAIS remains nascent, it provides a useful framework for understanding the importance of strategies for transitions and how finance can be mobilized not only to support innovation but to direct it toward socially and environmentally desirable outcomes.

History of agricultural investing in Canada

To understand how contemporary financing arrangements shape the directionality of agrifood transitions in Nova Scotia, it is necessary to situate current investment patterns within the broader historical evolution of agricultural finance in Canada. The mix of public, private, and cooperative investment has shifted substantially over time, influencing which forms of innovation have been prioritized. The following section outlines this history to foreground how historical financing structures continue to inform today's transition pathways.

Traditionally, in high income countries, the state was heavily involved in funding agricultural R&D and providing capital to producers. In Canada, throughout the 1980s up until 2015, public agriculture R&D spending has ranged from $400-$700 million, compared to private sector agriculture R&D spending during the same timeframe ranging from $10-$70 million (AIC, 2017). However, over time, the financing mix has shifted, particularly as demands for greater sustainability in food and agriculture have gained momentum. Venture capitalists' interest in agritech, for instance, rose 1600% globally between 2016 and 2021 (AgFunder, 2022). Venture Capital (VC) is a type of private equity that supports startups and early-stage companies by raising funds from funding partners, and often taking some form of ownership in these new companies (Silicon Valley Bank, 2025). Funding partners, also known as capital providers, can include government agencies, corporations or private individuals or other organizations (Marquis, 2024).

The Canadian Government has its own VC funding programs that invest in agtech, including a $194 million VC fund through Farm Credit Canada, and a $1 billion fund through the Business Development Bank of Canada (Remillard, 2017). Areas that received the most interest include bioenergy and biomaterials and farm robotics, and mechanization and equipment (AgFunder, 2024).

The Sustainable Canadian Agricultural Partnership (Sustainable CAP), an evolution of the previous Canadian Agricultural Partnership (CAP), is another primary funding tool of the federal government. The partnership involves cost-sharing between federal, provincial, and territorial governments to fund agricultural programs and activities aimed at "strengthen[ing] the competitiveness, innovation, and resiliency of the agriculture, agri-food and agri-based products sector" (Sustainable Canadian Agricultural Partnership, 2023). The current agreement has a budget of $3.5 billion over five years (April 2023-March 2028). In Nova Scotia, $46 million will be delivered through programs. At the time of this paper, the Nova Scotia Department of Agriculture has 21 funding programs in operation, including the Resilient Agricultural Landscape Program that supports the adoption of on-farm best management practices, along with market opportunities and diversification programs, labour bursaries, and business risk management programs (Government of Nova Scotia, 2025).

The province also has the Perennia Food & Agriculture Corporation, which is a provincial crown corporation aimed at supporting the growth, transformation and economic development of the sector. Currently, Perennia has four funding programs available for Nova Scotia agriculture, seafood, and food & beverage businesses, including an institutional procurement program, food safety program, and the On-Farm Climate Action Fund, the latter of which is another federal-provincial cost-share initiative (Perennia, 2025). Perennia offers some non-financial support through research and assessment services.

While traditional public sector spending such as Sustainable CAP and Perennia still exist, there has been a notable shift away from public towards private actors involved in financing the food and agriculture sector.

Since the 1980s, in high income countries there has been a general retreat of the state from treating agriculture as a public good, toward more neoliberal policies that prioritize profit, efficiency, and private goods (Beingessner et al, 2022). Reflecting this trend, expenditures in support of the agriculture and agri-food sector have been gradually declining both nationally and provincially in Canada. Increasingly, funds to support producers are aimed at managing risk and volatility rather than investing in new technologies (AIC, 2017). Producer support as a share of gross farm receipts was halved between 1986-88 to 2000-02, and halved again by the early 2010s, while total support for the agriculture sector represented 0.4% of Canada's GDP in 2019-21, a decrease of 1.6% from 1986-88 (OECD, 2022). At the same time, since the 1980s we have seen an increase in private agriculture R&D spending (Ibid). On a global level, private sector investments in agrifood technology have gone from $2.4 billion USD in 2013, up to $30.4 billion USD in 2022, with a peak up to $53.9 billion USD in 2021 (AgFunder, 2024).

Historically, however, the state has played a leading role in moving agricultural innovation forward. In 1886, the Federal Government of Canada established the Experimental Farm Branch, which led to the opening of five experimental farms across the country (Parks Canada, 2025). These farms laid the groundwork for agricultural research under government management to support crop development, pest control, and soil science, fostering growth in crop yields and quality. One of these farms, the Nappan Research Centre, was in Nova Scotia.

In Nova Scotia, the School of Agriculture was established in 1885, the Provincial Farm in 1889, and finally, the School of Horticulture in 1894. In 1905, these three agencies merged to form the College of Agriculture (Dalhousie University, 2025). Throughout this period, federal funds were used to encourage agriculture education and support farmers through programs such as extension services. These services, also prominent in the U.S., were provided in partnerships between agricultural colleges and Departments of Agriculture and developed and disseminated research and information on agriculture practices to communities (Bao et al., 2022).

After World War II, industrialized nations saw a shift to welfare-state approaches where the funding of research and innovation was aimed at supporting societal well-being (Glenna et al., 2015). Within the Keynesian economic framework, the state is responsible for addressing market failures and offering incentives for research investments that serve the public good, including agriculture and food production. During this time, Canada established government institutions and programs that provided state assistance to the farm sector, leading to a relatively stable and thriving sector (Beingessner et al., 2022).

The turn toward private sector involvement in the 1980s impacted the types of research that received funding. For instance, there is now much more funding available for research into genetic engineering, which delivers private profits, than for agroecological innovations, which provides more public goods shedding light on how different actors influence the directionality of food system pathways (Vanloqueren & Beret, 2009).Today, the presence of the private sector in the agrifood space continues to grow, with a growing shift towards venture capital (VC) investment. This type of investing in the agriculture sector became especially prominent in the early 2010s, following the

upswing and subsequent falter of VC investment into "cleantech" (Guthman & Fairbairn, 2024). Agrifood tech products that have been funded by VC include vertical farming, alternative proteins (ex. Impossible Burgers), and digital farming technologies, such as robotic harvesters (Ibid).

The influx of VC funding into the agriculture sector has raised compatibility questions (Fernandez-Vidal & Alarcon, 2025). VC investments inherently require near term profits to appease capital providers, and as Goldstein (2018) notes, this is often not compatible with the length of time needed to meaningfully address complex sector needs, particularly those with slow biological cycles like agriculture (Fernandez-Vidal & Alarcon, 2025). As stated earlier, the emphasis on profit impacts the types of research and innovation that gain support. Further, much of the new agtech is predicated on an under-analyzed assumption that traditional food production has failed, or is failing, raising compatibility questions for traditional producers seeking funding (Guthman & Fairbairn, 2024).

As this section outlines, the financing ecosystem for sustainable food and agriculture has undergone considerable shifts and is continuing to evolve. Knowing that the types of finance strongly dictate the direction of innovation, it is important to understand the contours of the financing mix as it relates to food and agricultural systems because it directly influences how sustainability transitions unfold.

Rural economic development and food activism in Nova Scotia

The financing shifts described above intersect with regional economic development challenges in distinctive ways. In Nova Scotia, and in many small, mixed rural-urban economies, the structure of investment has been shaped not only by federal policies but also by broader globalization dynamics, such as accelerating financial flows, capital mobility, and the resulting economic concentration and uneven geographies of inequality that contribute to regional disparities (Pike et al., 2017). Understanding this regional context is essential for interpreting the province's financing ecosystem, and scholarship on regional and rural economic development provides an important foundation for explaining the patterns observed in Nova Scotia.

Rural and regional economic development scholars have identified a persistent "finance gap" in regions outside of main city centres, and emphasize the social construction of markets. To design effective regional or rural economic development policy, the assemblages of people, objects, and activities must be carefully considered (Wray et al. 2017). This literature also highlights how limited access to capital and lack of long term planning have constrained innovation outside of major urban centres (Pike et al., 2017; Markey et al., 2005). Further, initiatives that prioritize rural-urban linkages and import substitution are promoted as ways to advance local and regional food systems as an economic development strategy (Jablonski et al., 2017).

This literature on rural development has blossomed in Europe largely as a result of the EU Common Agricultural Policy (CAP) second pillar, which is exclusively focussed on rural development. Since the early 2000s, this pillar has provided predictable, multi-year funding through multi-level governance; supported long-term, place-based rural economic

planning; and has funded innovation, diversification, infrastructure, local food systems, and social initiatives. It has also funded research to strengthen food systems across Europe. In contrast to the European context, Canada lacks an equivalent policy framework for sustained regional and rural investment. While there are federal initiatives aimed at increasing funding for rural development, including the Regional Economic Growth Through Innovation fund, Community Futures Program, and the Local Food Infrastructure Fund, Canada still lacks a coordinated, strategic approach like that of the EU. Funding remains fragmented and largely delivered through short-term, competitive programs.

Nova Scotia's food system reflects many of these broader dynamics of uneven regional development and fragmented support for food and agriculture. Nova Scotia has Canada's second smallest land base (approximately 55,284 sqkm) and its population hovers around one million inhabitants (Nova Scotia Department of Finance, 2024). Farming is dominated by small- and medium-scale enterprises producing dairy, poultry, fruit, vegetables, and wild blueberries. The fisheries sector remains a major economic driver, particularly through lobster, scallop, and groundfish exports (Government of Canada, 2022).

Cooperative traditions such as those associated with the Antigonish Movement helped establish a long-standing culture of mutual aid and community organization that continues to influence contemporary food activism and alternative food networks. Over the past two decades, groups like FarmWorks Investment Co-operative, the Ecology Action Centre, and the Halifax Food Policy Alliance have carried this legacy forward, linking food security, local food provisioning, and agroecological practices to broader struggles for sustainability and social justice (Andrée et al., 2016; Mount, 2012). Scholars note, however, that despite this strong base of civic engagement, Nova Scotia lacks a cohesive strategy that connects these grassroots efforts to long-term provincial policy for sustainable food and agriculture (Andrée et al., 2016).

The above context sets the stage for our empirical investigation by emphasizing the constructed nature of markets. Mapping Nova Scotia's financing ecosystem therefore offers a way to understand how it may influence the province's sustainability pathways. This paper asks: *What are the characteristics of the financing ecosystem for sustainable food and agriculture in the province?* And *how does this ecosystem shape sustainability trajectories in Nova Scotia?*

Methods

This study involved a combination of qualitative research methods including semi-structured interviews and document analysis with government employees, private investors, and non-profit actors. Purposive sampling was used to develop the sampling pool for this study (Palinkas et al., 2015). To begin identifying key players in Nova Scotia's financing ecosystem, the research team first relied on internet search by using terms such as "funding for sustainable agriculture and Nova Scotia"; "investing in food and agriculture Nova Scotia"; "venture capital for agtech in Nova Scotia". We initially prioritized funders and investors who are based in Nova Scotia and focus exclusively on supporting food and agricultural innovation in the province.

However, we broadened our search to include funders and investors that may also include other regions in their portfolios as long as their portfolios included companies in Nova Scotia. In the end we identified 25 funders and investors who met our criteria. We also spoke with four Nova Scotia based food and agriculture entrepreneurs to learn about their experiences and perception of the financing available for sustainable food and agricultural innovation in the province.

Through our interviews, we engaged in snowball sampling. In total, we interviewed all participants who responded to our request, resulting in 15 participants with interviews taking place between January and November 2024 (see Appendix A: Table 1). The semi-structured interviews lasted approximately 30 minutes to one hour in length, and the questions ranged from specific programming questions to broader themes around the financing ecosystem for sustainable food and agriculture in Nova Scotia. The interviews were recorded and transcribed in Otter.ai and a research assistant cleaned up the interview transcripts for any transcription errors. Next, the interviews were coded according to the principles of grounded theory (Saldana, 2009). The first round of coding involved a loose coding to identify broad themes and *invivo* codes. The second round involved organizing and synthesizing codes to identify specific categories and trends.

In total, we spoke with four government funders—one federal and two Nova Scotia Provincial, four private funders, one federal crown corporation, one NS Provincial Crown Corporation, and one private company which is not a funder but which has received financing. See Appendix A: Table 1 for a full breakdown of interview participants. Despite the research team's best efforts, there were certain programs and funds that were non-responsive or unwilling to be interviewed as part of this study. Some of these players like Perennia were considered critical in the financing and innovation ecosystems for food and agriculture in the province. In these cases, we gathered information about their programs from their websites to help determine their approach and role in the financing ecosystems for sustainable food and agriculture in the province. This document analysis involved searching these organizations' websites and coding any relevant reports or pages, which were informed by the thematic codes from the interview transcriptions.

Results and discussion

The findings below draw together interview insights and document analysis to characterize the structure of Nova Scotia's food and agriculture financing ecosystem. We present these results in relation to key themes identified in the sustainability transitions literature, particularly financing gaps, directionality of capital, and competing visions of sustainable futures.

A significant result of this study is a map of key actors in Nova Scotia's sustainable agriculture funding ecosystem. This map (Figure 1) is designed to be useful for policy- and decision-makers, funders, and those seeking funding. Currently no such resource is publicly available. The semi-structured interviews provided in-depth data on participant perspectives of the sustainable agriculture funding ecosystem in Nova Scotia. The semi-structured nature of the interviews allowed for more fulsome exploration of the research topic, helping to uncover nuances in perspectives and

experiences amongst funders and actors. We bring these findings together with insight from the literature on rural and regional economic development and sustainability transitions to advance recommendations on how the province might better support a thriving and sustainable regional food system.

Gaps in the food and agriculture funding ecosystem

According to interviewees, there are key gaps inhibiting the effectiveness of funding and financing targeting sustainable food and agriculture in the province. These include a lack of funds in general, insufficient support for mid-sized and growing businesses, and a mismatch in the type of capital required to finance a sustainable food transition.

Lack of capital

In general, the interviewees expressed that they perceive that there is insufficient capital in the province available to sustainable food and agriculture businesses, particularly as compared to other provinces.

> "If you're [an] early stage entrepreneur or trying to find some financing in Quebec, it's a whole different story, and in Ontario, those angel investors are writing quarter million- dollar cheques, not $25,000 cheques. So, it's hard to get the fundraising in that way here. We're just wired differently on the East Coast, I think. So, there's a gap there." (Participant #15)

Another interviewee described the small number of options for financing in this space in the region:

> "[T]he volume of options to capital and specifically in this sector are very few in Nova Scotia or Atlantic Canada, there [are a couple of public-private programs] and a bunch of family offices and that's it. Now it's not like you can't go out and look for the money and bring it back here. [...] But investment in early-stage developing companies is still a no because we don't have an extensive amount of expertise in the region around how to do it effectively." (Participant #8)

This fund manager, put it plainly:

> "There's absolutely not enough available capital to rebuild the food system in Nova Scotia." (Participant #2)

These quotes demonstrate the ways that interviewees consistently emphasized a significant gap in the availability and diversity of capital for sustainable food and agriculture businesses in Nova Scotia. They also tend to perceive Nova Scotia as lacking both the volume and scale of investment opportunities, particularly for early-stage ventures.

Goldilocks challenge

In addition to general funding shortages, interviewees identified a structural issue regarding which types of businesses are most likely to attract investment. This reinforces concerns in the literature about how financing models can privilege certain innovation pathways. Another challenge that was raised relates to the stages of business that tend to receive more or less funding in the province. One interviewee explained how the province [fails to] support slower growth companies with a regional, rather than global application. The support is available for companies demonstrating exponential growth with global impact

and also companies in pre-venue stages. But for those with steady growth, or post-revenue start-ups, there is a missing piece.

> "I think there's two things, if you have a truly global venture grade technology, VCs will find you and you will be investable. So, if you hit the mark and are truly disruptive and have a global market application targeting a $10 million TAM [total addressable market], we have built enough connections to get you invested. I think the challenge is not all companies are venture grade, so you may have a very good regional application…which is very innovative but it's not venture grade. And I think that's where there's a gap…I think it's a little bit of the Goldilocks: if you're this type of company, we can find your money. If you're really micro, there seems to be programs. But if you need $300,000 to $500,000 to build a company with good quadratic growth, I think that's where we have challenges." (Participant #14)

Another interviewee had a similar take on the orientation towards particular scales of business in the province,

> "I think we focus [here], in my opinion, a little bit too much on business attraction versus business incubation. So, we're happy to sign up with RBC to set up a big place in Bedford or we're happy to give John Bragg and Oxford a bunch of money to expand their blueberry operation, which is fair. But we're not doing a lot to fill the missing gaps, which is finding smaller companies that can grow and become those types of organizations." (Participant #15)

A program manager described the province's strengths—the pre-revenue startup phase. While this phase is critical for incubating niche innovations, there could be better support for post-revenue start-ups as they grow and expand their businesses.

> "There's a particular stage that we do very well here in Nova Scotia. We have a wonderful startup ecosystem…There's a lot of ecosystem alignment. We have a tremendous focus on pre revenue startups here. […] We have a well-defined continuum. We have a provincial government that's more focussed than the federal government." (Participant #14)

Our interviews highlighted a key challenge within Nova Scotia's financing landscape for sustainable food and agriculture which relates to the stages of business development that tend to receive support. While the province has cultivated a strong ecosystem for early-stage, pre-revenue startups, particularly those with technical innovations and high-growth potential, there is a notable gap in support for companies that are growing at a steady pace or have a primarily regional focus. Others noted that funding tends to favor business attraction over business incubation, with more emphasis placed on supporting large, established firms than on nurturing smaller enterprises with the potential to scale. As a result, many promising businesses that could contribute meaningfully to sustainable regional development struggle to secure the capital needed to grow.

Type of capital

Beyond quantity and scale, interviewees stressed that the *form* of capital matters, echoing sustainability transitions arguments that patient finance is essential for supporting long-term, mission-oriented change.

The type of capital available significantly influences the directionality of an investment. A Nova Scotia-based entrepreneur points out that the capital required for sustainable food and agriculture innovations needs to be patient. Patient capital involves investments in early-stage growth businesses with flexible terms, with longer time horizons for returns. It can be provided by private investors such as impact investors who prioritize social and environmental impacts alongside financial return, philanthropies, or governments. Patient capital

often serves to enable businesses to get to a point where commercial markets can invest.

We repeatedly heard through our interviews that the capital available for food and farming businesses in Nova Scotia is not patient enough. The protracted time frames characteristic of agriculture combined with the desire for social and ecological impacts, means that investors looking to turn a quick profit are unsuitable:

> "If you're going into sustainable future food, your capital has to have a long view. So then all of a sudden, you start to weed out a lot of players. In Nova Scotia, if we want sustainable food farms and production with the criteria that you could scale it and sell it to New York or wherever, but the other criteria is [that] it's got to benefit the province and our citizens, then the VCs tend to fall off the map." (Participant #1)

A fund manager echoes the need for capital with a protracted time frame in the province, if the goal is to build sustainable food systems:

> "We need patient capital, whether that's from philanthropic sources or whether that's from government sources or both. We also need different kinds of low-cost debt instruments, and we need equity and these different sources of capital will have to work in a more coordinated effort. And so, there's absolutely a shortage." (Participant #2)

Interviewees pointed to the inappropriate amount, scale, and type of capital as major barriers to achieving a more resilient and sustainable food system in Nova Scotia. The limited investments in the food and agriculture sector reflect the "retreat of the state" in agriculture that has swept through industrialized countries as neoliberalism gained momentum at the turn of the 21st century (Markey, 2005). A chronic funding gap for food and agriculture is a known trend amongst rural economic development scholars in both developed and developing contexts alike (Shucksmith, 2010). Nova Scotia is therefore not unique in facing diminished investment in the food system but several interviewees stressed the increasingly high risks of continuing to deprioritize food and agriculture in provincial and federal funding.

Our interviews emphasized that the capital flowing to food and agriculture enterprises in Nova Scotia currently tends to favour large, high growth businesses. This trend ultimately devalues smaller mid-sized operations, which are the backbone of resilient, sustainable food systems.

The current food system can be characterized as an hourglass—with consumers at one end and producers at the other, and farmers, processors, manufacturers and distributors, squeezed into an ever narrowing funnel in the middle (Howard, 2016). This "missing middle" is often used in sustainability transitions literature to describe the weakened infrastructure that serves mid-sized agriculture (Stahlbrand, 2016, 2017). Rebuilding the middle is essential for expanding alternatives to the industrial model. Investing in mid-sale infrastructure helps to widen markets for more sustainable, alternative food systems so that they can reach larger scales (Brownell, 2022).

Participants in our study reported significant gaps in capital availability, especially for projects that are outside of the purview of traditional production agriculture, leaving behind farmers and food entrepreneurs who do not fit the traditional mold, or who need patient capital to realize sustainable innovations. Addressing this financing gap will require deliberate policy and investment strategy shifts. Governments and public institutions have a critical role in providing patient, long-term finance targeted at societal missions (Mazzucato, 2018).

Nova Scotia is not unique in facing financing challenges when it comes to supporting agricultural innovation to enhance sustainability and food security.

Indeed, Fernandez-Vidal and Alacorn (2025) studied the ways in which agricultural innovation is financed across five continents and found that while traditional venture capital models dominate, they are ill-suited to supporting sustainable food systems. While venture capital has excelled in sectors that involve rapid iteration and digital scalability, agriculture requires "patience, lengthy product-validation cycles, and localized adaptation" (Fernandez-Vidal & Alacorn, 2025, p. 1). Therefore, innovation ecosystems must be aligned with the slower, biological cycles inherent in agriculture (Fernandez-Vidal & Alacarn, 2025). Funding horizons must be extended, and this could involve a combination of patient capital, blended finance, and public-private partnerships.

Enhancing partnerships in this way amongst various governance actors is in line with the ways in which the rural development literature has evolved, moving from an integrated to "dis-integrated" approach. This approach is characterized by a shift in the state's role, from directly delivering and directing services to acting more as a coordinator, facilitator, or overseer. It involves the creation of complex and overlapping governance arrangements and partnerships and brings new actors into decision-making, especially private organizations and community or non-profit groups (Shucksmith, 2010).

Mismatched or lack of coherent strategy

There is a clear need for greater coordination and a coherent provincial strategy if innovation ecosystems are to be better aligned with the slower, biological rhythms inherent in food and agriculture to achieve greater sustainability outcomes. However, several interviewees lamented the lack of an existing strategy. They identified that better partnerships between research, government, and businesses could better prepare the food and agriculture sector for the complex challenges it is facing.

An entrepreneur criticized the province for lacking a forward-thinking strategy, while it remains rooted in a traditional, conservative mindset:

> "if you look at financing sustainable food farms or food production, you've got this scattered map all over the province, and not only that, you don't have any strategy. The province has zero strategy. And it goes back to strategy and culture. And our culture in Nova Scotia is deeply rooted in what I call 'old ag' (agriculture)." (Participant #1)

This concern for a lack of strategy was echoed by another interviewee, stressing the need for stronger connections between research and the start-up ecosystem:

> "We need to do a better job taking ideas from universities and students and converting those people into entrepreneurs and then converting that idea into a business, because I think there's an active community here that [...] have good ideas all the time." (Participant #15)

Meanwhile, a fund manager explained how when there is a close connection between universities and start-ups, the province can benefit dramatically:

> "We have a lot of agricultural research and commercial activity in Nova Scotia that is very relevant. There was a company [...] that had a drone product that would look at crops and identify disease on those crops. That was really the marriage of Dalhousie, and 20 years of research on plant disease, married with a bunch of geeks who knew how to make drones and software. And so, those are things where really we get the best bang for our buck." (Participant #8)

Actors interested in local food systems specifically also noted the importance of strategy, and ensuring that government is directing the food system in a sustainable and resilient direction.

> "I think the problem is so big that there's never going to be a way to do this without a degree of government support. I would love to see a system of food hubs, perhaps strategically located within, for example, 50-kilometer radiuses. That is where we put our collective efforts into, rather than one-off, uncoordinated projects. Currently, food security work is all over the place." (Participant #12)

While there is strong agricultural research and innovation capacity within the province, it is not consistently leveraged or connected to entrepreneurial and commercial pathways. Interviewees noted that when these connections do occur, such as linking university research with start-ups, the benefits can be significant. There was also a call for government to take a more active role in shaping the direction of the food system by fostering collaboration, investing in infrastructure, and reducing reliance on under-resourced volunteer efforts. Without such strategic coordination and sustained support, the province risks missing opportunities to build a more resilient, equitable, and sustainable food future.

Taken together, these themes point to the need for frameworks that can help align diverse actors and innovation pathways. Agricultural innovation systems (AIS) are seen as prioritizing economic growth and productivity, while reinforcing unequal power dynamics and unsustainable patterns. Even when AIS focus on improving sustainability outcomes, they tend to favour tweaks to the industrial model which is characterized by monoculture productions and the heavy application of external inputs, as opposed to transitions towards alternative production systems. Mission-oriented agricultural innovation systems (MAIS) offer to remedy the shortcomings of AIS. MAIS are defined as, "the network of agents and set of institutions that contribute to the development and diffusion of innovative solutions with the aim to define, pursue and complete a societal mission" (Hekkert et al., 2020, 77).

The Netherlands stands out in terms of its approach to MAIS. In 2019 the government introduced mission-driven innovation policy for nine "Topsectors", which established 25 missions to reinforce the Dutch economy within the social themes energy transition & sustainability; agriculture, water & food; health & care and security (HSD Foundation, 2019). The Dutch agricultural knowledge and innovation system (AKSI) is defined by its "triple helix" or "golden triangle" model, whereby the government, private sector, and research institutions work closely together. The AKIS is comprised of, "vocational education systems, a three-tiered agricultural education structure, and active private sector involvement. These are supported by a proactive government that provides public services, funding, and defines innovation schemes in partnership with companies and research institutions" (OECD, 2023). The results of these efforts are noteworthy—the Netherlands is the second largest exporter of agricultural products in the world and remains and important agricultural producer despite its relatively small size and high population density (OECD, 2023).

Though the country has made impressive gains, more work remains to be done, particularly in sustainability. In an OECD report reviewing the progress made over the last decade, there is an identified need to "strengthen agricultural policy incentive for innovation and longer-term challenges, by developing a longer-term vision reconciling productivity growth and sustainability (OECD, 2023). By comparison, mission-orientation in food and agriculture systems remain nascent in Canada and Nova Scotia more specifically. Certainly, implementing MAIS in real-world settings is complex. Significant disagreements arise both across and within missions about the kinds of future agri-food systems they should advance, the technologies they rely on, the social and market arrangements they promote, and which missions policymakers and industry actors choose to prioritize, reflecting competing visions for how food systems ought to evolve (Klerkx & Rose, 2020; Montenegro De Wit & Canfield, 2024).

The multi-level perspective (MLP), a prominent transitions framework, highlights that transitions often unfold through multiple, parallel, and sometimes competing pathways that coexist for long periods before any clear direction emerges (El Bilali, 2019). In this sense, the diversity of visions and approaches we document is consistent with broader patterns observed in agri-food transitions internationally. Early transition stages are typically marked by experimentation, niche development, and a lack of alignment across actors.

Marsden (2013) applies the MLP to four scenarios for exploring possible transitions for food systems in the UK. His most optimistic scenario "into a new era" assumes that more of the "ecological 'externalities' are truly internalized into food production and consumption systems, and that a variety of socio-technical niches become mainstreamed and more institutionalized" (Marsden, 2013). To get there, what were once a fragmented set of niches, successfully scale-up to transform the incumbent regime towards sustainable food and rural development, at which point there becomes more path-interdependency between clusters of niches (Marsden, 2013). Regional and reflexive forms of governance are seen as an essential ingredient for this type of transition.

Given such theoretical perspectives from the sustainability transitions literature, the incoherence we identify should not necessarily be interpreted as policy failure, but rather as a characteristic of the current transition phase in Nova Scotia. At the same time, interviewees' concerns point to the need for mechanisms that can gradually foster greater coordination and directionality as innovations mature, which is required for a greater paradigmatic shift. Governance actors should also seek to embed reflexivity into their strategies in order to help pave transition pathways.

Competing sustainability visions

Interviewees expressed a wide range of views on what a sustainable food system should prioritize. While there is general agreement that the existing food system is unsustainable, funders and financiers have a range of opinions on what a sustainable pathway should look like, and this lack of coherent vision likely translates into an incoherent strategy for sustainable food and agriculture in the province.

This program manager speaks to the fundamentals of environmental sustainability:

> "That focus on the soil, the investment in the soil, and why that's so important now, because that's the long-term future." (Participant #3)

Another program manager, speaking from a young farmer's perspective added:

> "I see the environmental side of agriculture as being important, but I believe the social aspect is crucial and often overlooked…I believe that there are two essential areas of focus for sustainable agriculture. We need to ensure that underrepresented groups, such as young people, can get into agriculture and the family farm is viable. […] I want to support various scales of farming, whether its family farms selling directly to their communities or larger operations exporting outside of the continent." (Participant #7)

Others point to opportunities for economic sustainability in response to changing climates and food production needs:

> "We have regional disadvantages being the long end of the smokestack. Most of our food comes from California and Mexico, so we've got to get good at growing food locally and break that chain. So, even though vertical farms and indoor growing have faced significant headwinds, I think we'll see Nova Scotia and Atlantic Canada be one of the areas where perhaps it rebounds. […] We're never going to be a commodity producer. So, we have to look at higher value. So functional foods, natural products are going to be important things that aren't just low value commodities." (Participant #14)

> "I think if you look at some of the areas that are promising right now, I mean industrial, ag biotech…really provides a lot of opportunity for us to have a lot more strength in that area. There's a lot of discussion about creating more capacity on the fermentation side in Nova Scotia, which is desperately needed in Canada [and?] in general around the world." (Participant #8)

The variation in perspectives on sustainability outcomes reflects a wide range of priorities, from environmental stewardship to social equity and economic competitiveness. However, the absence of a shared vision makes it difficult to align investments and policy in a strategic way, ultimately contributing to fragmented efforts to transition to a more sustainable food system in the province.

Such divergent framings of sustainability are well documented in transitions scholarship, which observes that agri-food systems rarely converge on a single pathway early on; instead, multiple interpretations of desirable futures coexist and sometimes compete, shaping the iterative and non-linear character of transition processes (El Bilali, 2019). Although plurality and contestation are expected features of transitions, our findings indicate that certain forms of coordination, particularly around long-term investment planning and the provision of patient capital, remain underdeveloped in Nova Scotia. In other words, diversity of visions is not inherently problematic, but the absence of mechanisms to translate that diversity into complementary and mutually reinforcing actions limits the province's ability to move from experimentation toward more systemic change.

Conclusion

This study examined how sustainable food and agriculture initiatives in Nova Scotia are financed, and how these financial dynamics shape broader sustainability transitions. The findings reveal a financing ecosystem that is evolving but still marked by fragmentation, uneven access to capital, and uncertainty around long-term direction. Nova Scotia's experience reflects a broader pattern observed in many agri-food systems: while novel forms of innovation and investment are emerging, the overall landscape remains in an early, turbulent phase of transition (Klerkx et al., 2022). Interviewees consistently highlighted gaps in

capital availability, particularly for mid-scale and regionally focussed enterprises, and the prevalence of investment models that are poorly aligned with the slower biological and economic rhythms of agriculture.

The findings from this research point to a greater role for government in shaping research agendas, offering new, more stable sources of funding for longer-term sustainability challenges, and creating incentives for private investment into public goods. The need for more coherent policy in the form of a mission-oriented agricultural innovation system is clear.

The article reinforces that finance is not simply a background condition in sustainability transitions, it actively shapes which pathways gain momentum. In Nova Scotia, where climate risks, farm losses, food insecurity, and economic pressures are already acute, the need for forms of capital that match the rhythms and realities of food and agriculture is becoming increasingly clear. Although the province remains in an early and somewhat unsettled phase of transition, its existing strengths, robust agricultural research, long-standing civic food initiatives, and a growing set of funding efforts, offer some starting points for moving toward a more coordinated and resilient food system.

Acknowledgements: This research was generously funded by a McCall McBain Canadian Social Finance Network (CSFN) grant and supported by the Sustainable Finance Institute. Thank you to Abdullah Atiq and Twinkle Dev for supporting background research for this paper.

Dr. Phoebe Stephens is an Assistant Professor in the School for Resources and Environmental Studies at Dalhousie University. Her work explores the intersection between finance, sustainability transitions and food systems. For more details on Phoebe's research visit www.phoebegwenstephens.com

Vicki Madziak is the Community Food Specialist for the Halifax Regional Municipality. Her work focuses on increasing community and food systems resilience at the municipal level. For more information visit justfoodhalifax.ca.

References

AgFunder. (2022). 2022 AgFunder AgriFood Tech Investment Report. https://agfunder.com/research/2022-agfunder-agrifoodtech-investment-report/

AgFunder. (2024). 10 Years in Agtech and Foodtech. https://indd.adobe.com/view/b2839575-5e6f-4372-b98c-f82fd041a663

AIC. (2017). An overview of the Canadian Agricultural Innovation System. Agricultural Institute of Canada. https://www.aic.ca/wp-content/uploads/2021/04/AIC-An-Overview-of-the-Canadian-Agricultural-Innovation-System-2017.pdf

Anderson, C. R., & Maughan, C. (2021). "The innovation imperative": The struggle over agroecology in the international food policy arena. *Frontiers in Sustainable Food Systems*, *5*. https://doi.org/10.3389/fsufs.2021.619185

Andrée, P., Langille, L., Clement, C., Williams, P., & Norgang, E. (2016). Structural constraints and enablers to community food security in Nova Scotia, Canada. *Journal of Hunger & Environmental Nutrition*, *11*(4), 456–490. https://doi.org/10.1080/19320248.2016.1157547

Bao, L., Calice, M. N., Brossard, D., Beets, B., & Scheufele, K. M. (2022). How institutional factors at US land-grant universities impact scientists' public scholarship. SAGE Publications, 32(3). https://doi.org/10.1177/09636625221094413

Barua, B. and Whalen, A. (2023). Nova Scotia health-care system needs reform, not a blank cheque. Fraser Institute. https://www.fraserinstitute.org/commentary/nova-scotia-health-care-system-needs-reform-not-blank-cheque

Beingessner, N., Magnan, A., & Wendimu, M. (2022). "Land imaginaries" in Western Canada: (Financial) neoliberalism, agrarianism, and the contemporary politics of agricultural land. Sage Journals, 41(4). https://doi.org/10.1177/23996544221144168

Brownell, K. & ? (2022?). E178: A call to invest in agriculture's missing middle. *World Food Policy Center*. Retrieved November 27, 2025, from https://wfpc.sanford.duke.edu/podcasts/e178-invest-in-agricultures-missing-middle/

Canadian Press. (2024). Health-care spending, income tax indexing highlight Nova Scotia budget. https://globalnews.ca/news/10325680/ns-budget-2024-health-cost-of-living/

Coady Institute. (2018, August 27). *The Antigonish movement | Masters of their own destiny*. https://coady.stfx.ca/collection/the-antigonish-movement/

*Crossman, A. (*2023). *Bank closures a loss for rural N.S. communities*. (n.d.). PNI Atlantic. Retrieved November 27, 2025, from https://www.saltwire.com/atlantic-canada/anne-crossman-bank-closures-a-loss-for-rural-ns-communities-100911414

Cruz, J. (2024, April 29). *Press Release: Nova Scotia saw alarming increase in poverty and food insecurity—some of the highest in the country—CCPA*. https://www.policyalternatives.ca/news-research/press-release-nova-scotia-saw-alarming-increase-in-poverty-and-food-insecurity-some-of-the-highest-in-the-country/

Dalhousie University, Faculty of Agriculture, & Ells, D. (2025). Our Story. Dalhousie University. https://www.dal.ca/faculty/agriculture/about/history/our-story.html

El Bilali, H. (2019). The Multi-Level Perspective in Research on Sustainability Transitions in Agriculture and Food Systems: A Systematic Review. *Agriculture*, *9*(4), 74. https://doi.org/10.3390/agriculture9040074

Farla, J., Markard, J., Raven, R., & Coenen, L. (2012). Sustainability transitions in the making: A closer look at actors, strategies and resources. *Technological Forecasting and Social Change*, *79*(6), 991–998. https://doi.org/10.1016/j.techfore.2012.02.001

Fernandez-Vidal, J., & Alarcon, S. (2025). Financing agricultural innovation: Challenges and alternatives to venture capital in the AgTech sector. *Food Policy*, *136*, 102967. https://doi.org/10.1016/j.foodpol.2025.102967

Finance for food systems transformation. (2023). *Nature Food*, *4*(6), 437–437. https://doi.org/10.1038/s43016-023-00791-0

Geels, F. (2010). Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Research Policy*, *39*, 495–510.
Gorman, M. (2024, February 29). Nova Scotia budget includes more health-care spending, mild tax relief. *CBC News*. https://www.cbc.ca/news/canada/nova-scotia/budget-health-care-spending-1.7129437

Glenna, L., Shortall, S., & Brandl, B. (2014). Neoliberalism, the university, public goods and agricultural innovation. *Sociologia Ruralis*, *55*(4). https://doi.org/10.1111/soru.12074

Government of Canada, S. C. (2012a, December 10). *Farms classified by total farm area, Census of Agriculture historical data*. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210015601

Government of Canada, S. C. (2012b, December 10). *Land use, Census of Agriculture historical data*. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210015301

Government of Canada, S. C. (2021a, April 13). *Net farm income*. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210005201
Government of Canada, S. C. (2021b, April 13). *Value per acre of farm land and buildings at July 1*. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210004701

Government of Canada, S. C. (2022). *Lowbush blueberries, apples, mink and poultry play a large role in Nova Scotia farming*. https://www150.statcan.gc.ca/n1/pub/96-325-x/2021001/article/00003-eng.htm

Government of Nova Scotia. (2025). *Canadian Agricultural Partnership*. https://novascotia.ca/canadian-agricultural-partnership/

Guthman, J., & Fairbairn, M. (2024). Speculating on collapse: Unrealized socioecological fixes of agri-food tech. *Environment and Planning A: Economy and Space*, 0308518X241265283. https://doi.org/10.1177/0308518X241265283

Havemann, T., Negra, C., & Werneck, F. (2020). Blended finance for agriculture: Exploring the constraints and possibilities of combining financial instruments for sustainable transitions. *Agriculture and Human Values*, *37*(4), 1281–1292. https://doi.org/10.1007/s10460-020-10131-8

Health-care spending, income tax indexing highlight Nova Scotia budget—Halifax | Globalnews.ca. (n.d.). Retrieved November 27, 2025, from https://globalnews.ca/news/10325680/ns-budget-2024-health-cost-of-living/

Hekkert, M.P., Janssen, M.J., Wesseling, J.H., Negro S.O. (2020). *Mission-oriented innovation systems. Environmental Innovation and Societal Transitions*, 34, 76-79.

Howard, P. H. (2016). *Concentration and power in the food system: Who controls what we eat?* Bloomsbury Academic.
HSD Foundation. (2019). *Dutch cabinet launches mission driven top sectors and innovation policy*. https://securitydelta.nl/nl/component/hsd/newsitem/new-mission-driven-top-sectors-and-innovation-policy

Hursh, K. (2025, November 5). *Trump's trade policies take their toll on Canadian producers.* The Western Producer. https://www.producer.com/opinion/trumps-trade-policies-take-their-toll-on-canadian-producers/
Jablonski, R., Hendrickson, M., Vogel, S., & Schmit, T. (2017). Local and regional food systems driving rural economic Ddvelopment. In *Harvesting Opportunity: The Power of REgional Food System Investments to Transform Communities* (pp. 57–79). Federal Reserve Bank of St. Louis.

Klerkx, L., & Begeman, S. (2020). Supporting food system transformation: The what, why, who, where and how of mission-oriented agricultural innovation systems. *Agricultural Systems*, *184*.

Klerkx, L., & Rose, D. (2020). Dealing with the game-changing technologies of agriculture 4.0: How do we manage diversity and responsibility in food system transition pathways? *Global Food Security*, *24*, 100347.

Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M. S., ... Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, *31*, 1–32. https://doi.org/10.1016/j.eist.2019.01.004 - missing from in-text citations.

Kok, K. P. W., & Klerkx, L. (2023). Addressing the politics of mission-oriented agricultural innovation systems. *Agricultural Systems*, *211*, 103747. https://doi.org/10.1016/j.agsy.2023.103747

Leach, M., Stirling, A. C., & Scoones, I. (2010). *Dynamic sustainabilities: Technology, environment, social justice*. Taylor & Francis. https://doi.org/10.4324/9781849775069

Loorbach, D. A., & Huffenreuter, R. L. (2013). Exploring the economic crisis from a transition management perspective. *Environmental Innovation and Societal Transformations*, *6*, 35–46.

Marsden, T. 2013. From post-productionism to reflexive governance: Contested transitions in securing more sustainable food futures. *Journal of Rural Studies*, 29, 213-124.

Marquis, S. (2024). Optimizing stewardship of the land?: Digital agriculture and the ideology of optimization in Canadian policy and media discourse. *Canadian Food Studies / La Revue Canadienne Des Études Sur l'alimentation*, *11*(3), 113–141. https://doi.org/10.15353/cfs-rcea.v11i3.685

Mazzucato, M. (2013). Financing innovation: Creative destruction vs. Destructive creation. *Industrial and Corporate Change*, *22*(4), 851–867.

Mazzucato, M. (2018). Mission-oriented innovation policies: Challenges and opportunities. *Industrial and Corporate Change*, *27*(5), 803–815. https://doi.org/10.1093/icc/dty034

Mazzucato, M., & Semieniuk, G. (2018). Financing renewable energy: Who is financing what and why it matters. *Technological Forecasting and Social Change*, *127*, 8–22. https://doi.org/10.1016/j.techfore.2017.05.021

Mazzucato, M., & Wray, L. R. (2015). *Financing the capital development of the economy: A Keynes-Schumpeter-Minsky synthesis* (SSRN Scholarly Paper No. 2603847). Social Science Research Network. https://doi.org/10.2139/ssrn.2603847

Montenegro De Wit, M., & Canfield, M. (2024). "Feeding the world, byte by byte": Emergent imaginaries of data productivism. *The Journal of Peasant Studies*, *51*(2), 381–420. https://doi.org/10.1080/03066150.2023.2232997

Mount, P. (2012). Growing local food: Scale and local food systems governance. *Agriculture and Human Values*, *29*(1), 107–121. https://doi.org/10.1007/s10460-011-9331-0

Mughees, M. (2025). "Food is a love letter to the future": The importance of farmers' markets in Nova Scotia. *Halifax Examiner*. https://www.halifaxexaminer.ca/equity/food-is-a-love-letter-to-the-future-the-importance-of-farmers-markets-in-nova-scotia/

Naidoo, C. P. (2020). Relating financial systems to sustainability transitions: Challenges, demands, and design features. *Environmental Innovation and Societal Transformations*, *36*, 270–290. - missing from in-text citations.

Nova Scotia Department of Finance—Statistics. (2024). https://novascotia.ca/finance/statistics/archive_news.asp?id=19662

OECD. (2022). Agricultural policy monitoring and evaluation 2022: Reforming Agricultural Policies for Climate Change Mitigation. https://www.oecd.org/en/publications/agricultural-policy-monitoring-and-evaluation-2022_7f4542bf-en.html

OECD. (2023). *Policies for the future of farming and food in the Netherlands*. OECD Publishing. https://doi.org/10.1787/bb16dea4-en

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. Administration and Policy in

Mental Health, 42(5), 533. https://doi.org/10.1007/s10488-013-0528-y

Parks Canada. (2025). Establishment of the Experimental Farm Branch national historic Event. https://www.pc.gc.ca/apps/dfhd/page_nhs_eng.aspx?id=1707&i=59092

Perennia. (2025). Programs. *Perennia*. https://www.perennia.ca/programs/

Pike, A., Rodríguez-Pose, A., & Tomaney, J. (2017). Shifting horizons in local and regional development. *Regional Studies*, *51*(1), 46–57. https://doi.org/10.1080/00343404.2016.1158802

PROOF. (2024, April 26). New data on household food insecurity in 2023. *PROOF*. https://proof.utoronto.ca/2024/new-data-on-household-food-insecurity-in-2023/ - missing from in-text citations

Reeder, N., & Colantino, A. (2013). *Measuring impact and non-financial returns in impact investing: A critical overview of concepts and practice*. European Investment Bank Institute.

Remillard, R. (2017). Government intervention in venture capital in Canada: Toward greater transparency and accountability (No. 466). C.D. Howe Institute. https://cdhowe.org/wp-content/uploads/2025/01/Commentary_466.pdf

Rideout, K., Mah, C. L., & Minaker, L. (n.d.) - listed as 2015 above - . *Food environments: An introduction for public health practice*.

Saldana, J. (2009). *The coding manual for qualitative researchers*. SAGE Publications Ltd.

Sean Markey, J. T. P. (2005). *Second growth*. UBC Press; UBC Press. https://www.ubcpress.ca/second-growth - should this appear under Markey?

Shucksmith, M. (2010). Disintegrated rural development? Neo-endogenous rural development, planning and place-shaping in diffused power contexts. *Sociologia Ruralis*, *50*(1), 1–14. https://doi.org/10.1111/j.1467-9523.2009.00497.x

Silicon Valley Bank. (2025). *What is venture capital?* https://www.svb.com/startup-insights/vc-relations/what-is-venture-capital/

Smith, A., Vob, J.-P., & Grin, J. (2010). Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Research Policy*, *39*(4), 435–448.

Stahlbrand, L. (2016). A typology of "infrastructure of the middle" in university food procurement in England and Canada: *Raízes: Revista de Ciências Sociais e Econômicas*, *36*(2), 32. https://doi.org/10.37370/RAIZES.2016.V36.457

Stahlbrand, L. (2017). Can Values-based Food Chains Advance Local and Sustainable Food Systems? Evidence from Case Studies of University Procurement in Canada and the UK. *International Journal of Sociology of Agriculture and Food*, *24*(1), 77–95.

Steffen, B., & Schmidt, T. S. (2021). Strengthen finance in sustainability transitions research. *Environmental Innovation and Societal Transitions*, *41*, 77–80. https://doi.org/10.1016/j.eist.2021.10.018

Stephens, P. (2021). Social finance for sustainable food systems; opportunities, tensions and ambiguities. *Agriculture and Human Values*, *38*, 1123–1137.

Sustainable Canadian Agricultural Partnership. (2023, March 6). https://agriculture.canada.ca/en/department/initiatives/sustainable-canadian-agricultural-partnership

Torgerson, R.E., Bruce, R., & Gray, T. W. (1998). Evolution of cooperative thought, theory and purpose. *Journal of Cooperatives*, *13*, 1–20.

Vanloqueren, G., & Baret, P. V. (2009). How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations. Research Policy, 38(6), 971–983. https://doi.org/10.1016/j.respol.2009.02.008

Wade, T. (2022, December 7). *Overview of Canadian communities exposed to sea level rise*. National Collaborating Centre for Environmental Health | NCCEH - CCSNE. https://ncceh.ca/resources/evidence-reviews/overview-canadian-communities-exposed-sea-level-rise