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"Not a siloed effort": Partnership strategies supporting regional grain value chains in the Upper Northeast, USA

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Abstract

The industrialization and commodification of grain production has had major environmental, health, and economic implications. Pushing back against this commodity system, grain value chains are emerging in the form of collaborations between farmers, millers, bakers, maltsters, and brewers. These partnerships are part of a broader movement toward the development of values-based supply chains in the food system, in which business partners establish long-term, strategic partnerships based on shared values like fairness, commitment

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to community, and environmental sustainability. In these arrangements, farmers capture a larger share of the food dollar than in commodity supply chains and are treated as valued partners rather than interchangeable suppliers. Despite the presence of localized grain value chains throughout the U.S., little research exists on their development or functioning. This study examines the nature of partnerships in grain value chains in the Northeast, where food-grade grain production is particularly challenging but nonetheless present. We present a multiple-case study of three established grain value chains—Maine Grains, Farmer Ground Flour, and Valley Malt—that examines the nature of their partnerships and the strategies they employ to navigate challenges in their values-based supply chains. The findings from this study, which are drawn from 41 in-depth interviews with grain growers, processors, end-users, and other key informants, demonstrate that developing committed, trusting, and interdependent partnerships that value one another's success is key to the functioning of these grain value chains.

Keywords
grain, grain value chain, local grain, Northeast, local and regional food systems (LRFS), values-based supply chains (VBSCs), value chain coordination (VCC)

Introduction and Literature Review

Over the course of the last 60 years, the industrialization and commodification of grains has had major environmental, health, and economic implications. In the U.S., communities have lost access to culturally significant and locally and agroecologically grown grains (Fedco Seeds, n.d.; Lindell, 2023; Wall Kimmerer, 2018). Grains have become global commodities and an industry dominated by four companies that control around 90% of the global grain trade (Murphy et al., 2012). In fact, collusion in global grain trade has occurred since the 1950s (Murphy et al., 2012). The intense consolidation and concentration in the grain sector leaves little to no room for small-scale producers to compete, affecting growers and communities worldwide (Heffernan et al., 1999; Murphy et al., 2012).

In response to these many threats and challenges, alternative grain movements are emerging globally as farmers, millers, maltsters, bakers, and brewers create noncommodity, local and regional grain value chains (Blair & Dimitri, 2017; Forrest & Wiek, 2021; Halloran, 2015; Simpson & McLeod, 2013; Ulmet, 2021). Organizations like the Maine Grain Alliance, the Artisan Grain Collaborative, the Colorado Grain Chain, and many others are evidence of this movement taking shape. These groups create a forum for sharing technical assistance and specialized equipment, provide access to suitable seed varieties, conduct market matchmaking, and raise consumer awareness to support small- and midscale farmers in grain value chains.

These grain value chains are part of a broader movement toward the development of values-based supply chains (VBSCs) in the food system, defined as long-term, collaborative business partnerships that prioritize values like price equity, transparency, and trust in their operations. VBSCs deliver value-added and differentiated end-products that allow farmers to capture a price premium (Stevenson & Pirog, 2008). A major goal of these models is to provide market access for small- and midscale farmers who cannot easily sell through existing commodity markets and for whom direct-to-consumer marketing outlets are insufficient (Dimitri & Gardner, 2019; Rosol & Barbosa, 2021). Grain networks based on values aside from profit are positioned to innovate and transform the marketplace (Choi, 2023).

Collaboration is crucial in grain value chains to overcome the many challenges they face. As examples, participatory methods are used to select, breed, and adapt alternative grain varieties to new regions and ensure their usability in both the field and end-use products through field trials and baking trials (Brouwer et al., 2016; S. S. Jones & Econopouly, 2018; Kissing Kucek et al., 2017; Sandro et al., 2022). Since the widespread adoption

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of roller milling in the 1900s, knowledge about stone milling and craft malting (which are more scale-appropriate to VBSCs) has largely been lost, so millers and maltsters have formed grassroots networks like the Craft Maltsters Guild and the Craft Millers Guild (Craft Millers Guild, n.d.; Craft Maltsters Guild, n.d.). Farmers work closely with millers and maltsters, who are in close communication with bakers and brewers, to understand specific needs along the supply chain.

Despite these collaborative efforts, challenges remain. In a needs assessment conducted from 2020 to 2022, the Northeast Grainshed Alliance (NGA) identified a number of critical obstacles inhibiting the development of the region's grainshed, including a lack of value chain coordination, insufficient infrastructure, limited access to primary and secondary markets, lack of purchasing commitments, and the high cost of growing food-grade grain varieties. "The most important action step" the NGA identified was for "people or organizations that can serve a bridging function between grainshed actors" to "bring buyers and sellers together, [facilitate] communication and [provide] supply chain coordination" (Northeast Grainshed Alliance, 2022, pp. 23–25).

Other research has revealed the challenges associated with grain value chains or local grain economies, many of which overlap with those of VBSCs more broadly. Our review of the literature identified five broad challenges that we investigated in this study: (1) Overcoming challenges associated with grain production and meeting food- or malt-grade grain quality specifications (Baker & Russell, 2017; Hills et al., 2013b; Stevenson et al., 2014; Stevenson & Pirog, 2013); (2) Securing and arranging post-harvest equipment and storage infrastructure in the supply chain (Baker & Russell, 2017; Blair & Dimitri, 2017; Hills et al., 2013a, 2013b; Ruhf & Clancy, 2022; Wang et al., 2020); (3) Developing effective logistical systems to plan for product aggregation, processing, and distribution, especially for procuring adequate grain supply (Hergesheimer & Wittman, 2012; Stevenson et al., 2011, 2014; Stevenson & Pirog, 2008); (4) Creating suitable contracts or agreements that facilitate risk-sharing among partners (Lev & Stevenson, 2013a; Stevenson et al., 2014; Stevenson & Pirog, 2008, 2013); and (5) Determining appropriate strategies for pricing and ensuring farmers' access to added value (Hergesheimer & Wittman, 2012; Hills et al., 2013a, 2013b; Lev & Stevenson, 2013a).

Understanding the partnership strategies that allow grain value chains to overcome these obstacles is therefore valuable for both the growth of grain networks and the development of VBSCs and regional food systems more broadly. This study examines how three established grain value chains in the Upper Northeast (the six New England states and New York state) are navigating these challenges. Our findings detail structural challenges and opportunities that may support the development of new grain value chains and clarify roles for organizations like the NGA, the Maine Grain Alliance, and university cooperative extension programs. It could also inform the development of VBSCs in other regions and in sectors that face similar obstacles, such as livestock, dry beans, and other staple crops.

Regionalizing the Northeast's Food System

A major goal of regional food system development is to move toward "regional food self-reliance," or producing as much food as possible for the region's population from within the region (Ruhf & Clancy, 2022, p. 62). Achieving regional self-reliance is a challenge for the Northeast because the region has a large population for its size (nearly a quarter of the U.S. population) and lacks large areas of land suitable for agriculture (just 3% of U.S. cropland) (Griffin et al., 2018). When assessing the potential for regionally grown grain in the 2014 *New England Food Vision* report, the authors call for being strategic as the region works toward increased self-provisioning (Donahue et al., 2014). While over half (56%) of farmland in the Northeast was dedicated to livestock feed production, only 8% was cropland in *food* production. Of that, food grains (grains for human consumption) accounted for the largest share of cropland (34%); yet this translated into a regional self-reliance rating (for grain for human consumption) of just 8% due to the fact that grain production requires a relatively substantial amount of land—an estimated five times as much land is needed for grain as for fruit and vegetable production (Griffin et al., 2015,

2018). An updated New England regional food system report in 2023 found that increasing the region's food self-reliance will require increasing regional grain production, which means agricultural land dedicated to food-grains would need to increase significantly (Peters et al., 2023). Considering the region's limited and decreasing amount of agricultural land, it would be unrealistic for the Northeast to provide even close to its total grain supply. However, grain's role in climate resilience through crop rotations and cover cropping, the benefits of regionally produced feed for local animal agriculture, and a flourishing market for local grain-based foods, beer, and spirits all underscore the need for increasing production and developing grain-focused value chains in this region (Donahue et al., 2014).

Values-Based Supply Chains to Regionalize the Northeast's Food System

In response to these efforts to increase regional food reliance, researchers are investigating VBSCs for their capacity to develop strategic partnerships along the supply chain to support price equity for farmers and create access to larger markets (Dimitri & Gardner, 2019; Rosol & Barbosa, 2021). VBSCs operate at a regional scale and handle "significant volumes" (Stevenson & Pirog, 2013, p. 3) of food products, offering the potential to contribute to regional food system development by both filling the marketing gap for midsized farms and aggregating products from many small farms (Clark et al., 2021; Hardesty et al., 2014; Stevenson & Pirog, 2008, 2013). VBSCs are generally better suited than direct marketing for low-value crops that require specialized cleaning and processing equipment, like food grains or legumes, when grown for local or regional markets. For the purposes of this paper, we use the term "grain value chain" for conciseness to refer to VBSCs that handle food grains, as distinct from the use of the term "value chains" used to describe commodity supply chains.

When faced with the impacts of the coronavirus pandemic, local and regional food systems, and VBSCs specifically, were recognized for their adaptability and resilience. Thilmany et al. attribute this "nimbleness" to the close relationships between supply chain partners that enabled them "to leverage community networks to find necessary inputs" (2021, p. 87). This ability of VBSC partners to quickly innovate under pressure starkly contrasted with the inflexibility of commodity and global food supply chains, which saw major disruptions.

Similarly, the small number of studies on local grain economies emphasize the values- and partnership-basis of grain value chains (e.g., Halloran, 2015; Ulmet, 2021). These studies highlight the mutually beneficial business partnerships (Baker & Russell, 2017); the connections between place, ethics, and passion for artisan products (E. Jones & Harvey, 2017); and the grower-to-miller and miller-to-baker-consumer links that are critical to the continuation of these networks, facilitating multiple connections and opportunities for the alternative grain network (Hergesheimer & Wittman, 2012). They emphasize the importance of trust among partners in these intermediated marketing chains and point out that "re-localization efforts for staple crops have been underrepresented in the local foods movement despite their importance in human diets" (Hills et al., 2013b, p. 29; 2013a). While the findings from these studies support the use of the VBSC framework, only one study we found has used this framework to examine a *grain* value chain. Lev and Stevenson's (2013b) case study provides an example of how a grain-based VBSC in the Pacific Northwest sourcing from about 20 growers determined a fair pricing structure, achieved economic sustainability, organized supply chain logistics, procured necessary equipment and infrastructure, and created effective internal organizational forms.

This small body of research reveals a need to understand the functioning of grain value chains more thoroughly. Forrest and Wiek call out the gap in existing research on the "size, structure, development, and sustainability" (2021, p. 508) of local grain economies. A gap also exists on the "[feedback] mechanisms between farmers, processors, handlers, and consumers," which is important to "increase efficiencies in sharing best practices, specifications, and needs throughout the [grain] supply chain" (Blair & Dimitri, 2017, p. 58). Our multiple-case study of grain value chains in the Upper Northeast contributes to this knowledge

gap by providing insights into the partnership strategies of three VBSCs that have persisted for over a decade. This study identifies key organizational elements connected to the functioning of grain value chains while also illustrating the importance of social relationships in shaping their overall effectiveness. In this way, the research contributes to understanding the barriers to the regional grain economy's growth and what might be needed to overcome those barriers. In addition, our study can support the development of new VBSCs in the region by demonstrating successful partnership strategies as well as lessons learned.

Applied Research Methods

This qualitative research uses a multiple-case study design to understand the functioning of three regional grain value chains in the Upper Northeast U.S. A multiple-case study design provided an appropriate framework for examining three distinct grain supply chains in sufficient depth and in comparison to each other (Yin, 2018). The three cases, Maine Grains, Farmer Ground Flour, and Valley Malt/Ground Up Grain, were selected after a year of preliminary research by the lead author that included nearly 20 conversations and attendance at five grain-focused events in the region. They were selected because they all meet the VBSC criteria as long-term, collaborative business partnerships prioritizing values like price equity, transparency, and trust in their operations (Stevenson & Pirog, 2008). All three cases are midscale processors that purchase primarily or exclusively Northeast-grown grain from multiple growers and sell to distributors, wholesalers, end-users (bakeries, breweries, distilleries, restaurants, etc.), and retailers, mainly within the region. Each is a privately owned business that began operating between 2007 and 2012 and has an aggregating intermediary entity (a flour mill or malthouse) that works closely with key partners on either side of the supply chain: farmers supplying grain, and bakers, brewers, and other end-users purchasing the processed product (cleaned grain, flour, malt, or other value-added product). The Northeast local grain sector as a whole is diverse, with some farms processing and marketing their own grains to consumers, some forming relationships directly with restaurants or breweries, and others contract growing (GrowNYC & Organic Growers' Research and Information-Sharing Network [OGRIN], 2016). These three cases represent the larger regional grain supply chains within the sector in terms of the number of producers, processors, and end-users involved, and those that fit the VBSC definition, of which there are likely fewer than 30 in the region.

Based on relationships the lead author established in the preliminary phase with the owners of the three grain processing businesses, the processor-owners invited key partners in each of their supply chains to participate in the study. The lead author conducted a total of 41 semi-structured interviews by Zoom or phone between August and December 2023 with each of the three owner-processors, and with three to four growers, four end-users, and one to three nonprofit or Cooperative Extension professionals directly involved in each of the three grain value chains. She also conducted interviews with an additional 10 key informants who worked outside the three grain value chains. The lead author began each interview by asking about the story and early development of the enterprise and its initial partners. The interviews included questions about the enterprise's organizational structure, its practices, the scale and type of its operation, its financial viability, and its current business partners. Next, the interviewer asked about the biggest challenges the enterprise has faced, how it has overcome them, and how its challenges have changed over time. If the challenge was not already raised, the lead author asked how the individual and their partners have navigated the five common challenges faced by grain value chains (and VBSCs broadly) identified in the literature review and preliminary research: grain production and quality, post-harvest handling, supply planning, contracts and agreements, and pricing.

All interviews were recorded, transcribed by a third-party transcription service, and analyzed with the qualitative analysis software NVivo. The lead author developed a coding scheme using Saldña's (2013) qualitative coding methodology. The coding scheme reflected the preliminary research and literature review to understand the nature of partnerships along the supply chain. Major themes in the analysis were the degree and effectiveness of trust,

transparency, communication, and information flow among partners, which are all factors identified as important to the functioning of VBSCs and the degree of fairness within the supply chain.

Once coding was complete, the lead author and a research assistant reviewed all material under each code and synthesized the findings for analysis. Considering the small number of regional food-grade grain processors in the Northeast, efforts to de-identify the three processors and many of the businesses in the study would have been extremely difficult. As a result, the lead author obtained consent from the study participants to use their names and their businesses' names in the case studies, with the exception of two farmers who elected to be de-identified. This research process was approved by the University of New Hampshire's Institutional Review Board in 2023 (#IRB-FY2023-201).

Findings

The following case descriptions provide a brief overview of the focal business of each of the three grain value chains (Table 1). We then present aggregated findings related to the five key challenges outlined in the Introduction and Literature Review, and the strategies the partners employ to address each challenge (Table 2). Based on our analysis we define *partnership strategies* as intentional actions that processors or intermediaries take, going beyond their basic business operations, that exercise values like trust and fairness. These findings address the questions, "What is the nature of partnerships in three grain value chains?" and "How do partners work together to overcome common challenges VBSCs and grain value chains face?"

Farmer Ground Flour

Thor Oechsner, an organic field crop grower in the Finger Lakes region of New York, founded the flour mill Farmer Ground Flour with another farmer in the area in 2008. Oechsner had been looking for ways to add value to his farm, as he realized he would otherwise need to dramatically expand his operation to support his livelihood in agriculture. The two farmers invited Greg Russo, a Cornell student who became the flour mill's first employee, to be one-third owner in the business. A few years after Farmer Ground Flour's founding, Oechsner teamed up with his close friend Stefan Senders to start a bakery down the street that would use Farmer Ground Flour to make bread and pastries, which they named Wide Awake Bakery. Oechsner and Russo are each still one-third owners of the flour mill, but the other founding farmer has since left the business, and a commercial electrician, Neal Johnson, joined the mill as an employee and co-owner. The mill continues to source grain from Oechsner as well as about 10 additional farmers in the area who grow organic grain. The mill sells flour wholesale to bakeries, restaurants, and co-ops, and wholesale-to-retail (two-pound bags) to Whole Foods, farm stores, and other retailers.

Maine Grains

Conversations among community members in rural Skowhegan, Maine, about reviving the state's local grain economy led to the first 'Kneading Con-

Table 1. Summary of Grain Value Chain Case Studies

Case	Organization type	Location	Motivation for starting	Year founded
Farmer Ground Flour	LLC, equally owned by one farmer and two mill employees	Trumansburg, New York	Add value to farm	2008
Maine Grains	C Corp, majority owned by CEO/co-founder	Skowhegan, Maine	Fill local/regional processing gap; Community development	2012
Valley Malt (VM) Ground Up Grain (GU)	Separate LLCs, both family-owned by the same owners	Holyoke, Massachusetts	Fill local/regional processing gap	2009; 2018

Table 2. Summary of the Partnership Strategies Employed in the Grain Value Chain Cases

Challenge(s)	Partnership strategy	Case(s) employing the strategy
Grain production and quality	Introduction of Crop Rotation beans as a branded product	Maine Grains
	Partnering with end-users for bake tests of grain quality and performance	Farmer Ground Flour; Maine Grains; Valley Malt
Grain production and quality; Supply planning	Annual farm visits before grain harvest	Valley Malt
Supply planning	Clear and ongoing communication with growers throughout the year	Farmer Ground Flour; Maine Grains; Valley Malt
	Farm and crop "matchmaking"	Farmer Ground Flour; Maine Grains; Valley Malt
	Annual planning with large-scale end-users	Farmer Ground Flour; Maine Grains; Valley Malt
Post-harvest handling	Lifetime leases on equipment	Maine Grains (Maine Grain Alliance)
	Technical assistance grants for equipment and infrastructure	Maine Grains (Maine Grain Alliance)
Contracts and agreements	Acreage contracts	Valley Malt; Maine Grains
	Processor provides seed to growers	Farmer Ground Flour; Valley Malt
	Required written contracts with all farm partners, with new or "high-risk" farm partners	Farmer Ground Flour; Valley Malt
Contracts and agreements; Pricing	Forward and fixed/historic-price contracts	Farmer Ground Flour; Valley Malt; Maine Grains
Pricing	Price premiums for growing location and practices	Farmer Ground Flour; Maine Grains

ference' in 2007 and the founding of the nonprofit Maine Grain Alliance in 2010. These initiatives provide technical assistance and convene bakers, millers, farmers, and other grain enthusiasts in workshops and discussions around local grain production, processing, and use. Observing the gap in local grain processing in Maine and seeing the potential for a flour mill to contribute to the community of Skowhegan's development, Amber Lambke, the Maine Grain Alliance's founding director, went on to co-found the gristmill Maine Grains in 2008 and launch the business in 2012. Lambke, originally a trained speech pathologist, continues to serve as the CEO of Maine Grains, whose other co-founder has since left. A certified organic facility, Maine Grains sources organic and untreated grain from farmers across the Northeast and sells its flour and grain products to bakeries, restaurants, breweries, grocers, co-ops, farm stores, and other retailers within the region.

Valley Malt and Ground Up Grain

Avid home brewers Andrea and Christian Stanley were inspired to explore local sourcing for their beer-making hobby when they learned that their favorite bakery down the street was attempting to grow its own wheat for flour. Inspired, the couple began looking for local ingredients to use in their

beer, but soon realized there was a missing link in the regional beer supply chain: malt. Quickly studying everything they could find about craft malting, the Stanleys, a vocational rehabilitation counselor and a mechanical engineer, set up their own malting operation in their basement and founded Valley Malt in 2009. Almost 10 years later, already having worked closely with Northeast farmers for almost a decade to source grain for their malthouse, the Stanleys were approached by the same local bakery about milling flour for its bread. The couple agreed and founded Ground Up Grain in 2018, which shares much of the same sourcing, equipment, and staff as Valley Malt. In 2021, the Stanleys received a grant through the state of Massachusetts to establish a grain hub in Holyoke, Massachusetts, where the two sister companies operate. The malthouse sells malt and grain to breweries, distilleries, and bakeries, and the mill sells flour to bakeries, bagel shops, pizzerias, farm stores, co-ops, and grocers throughout the Northeast.

Grain Production and Quality

> That's the trade-off of using local grain; [it] still has to deal with the weather.
>
> —*Zack Robinson, co-founder of Short Path Distillery*

Growing grains in the Upper Northeast proves much more challenging than in "typical" grain-growing regions such as the Cornbelt states. Moisture and humidity from the short, wet growing season make achieving food- and malt-grade quality specifications even harder. Grains used for human consumption must meet high quality parameters; they are strict for grain used for flour and stricter yet for grain intended for conversion to malt. Preharvest sprouting and fusarium head blight are two common challenges farmers in the Upper Northeast experience, which affect the quality of the starch and the prevalence of the mycotoxin deoxynivalenol (DON), respectively, in the grain. Farmers face the mounting effects of climate change through wetter summers, changes to winter snowpack, and harsher temperature fluctuations, all of which threaten the quality of their grain and its safety for human consumption. Researchers are continuing to work collaboratively with farmers to identify old varieties and breed new varieties that grow well in the region to maintain and build growers' access to food and malt grain markets.

Partnership Strategies

Grain that does not meet certain quality parameters can be difficult (and even dangerous) to use in baking or brewing. When they first started purchasing from Maine Grains in the mill's early years, South Portland, Maine, bakery co-owner Allison Reid stated, "[If] anything was up with the flour, we could call them right away, or text them, and we'd get an answer. And I just love that, that team effort, so to speak. And it's kind of been that way ever since." More recently, farmers struggled in 2023 when a beautiful spring turned into an unusually rainy summer. One Vermont bakery owner explained that their longstanding partnership with a farmer allowed them to overcome the rain: "[As] bad as the weather was this summer, . . . our farmers had this commitment with us. And they said, 'You know, if we have grain that's good, we'll sell it to you.' And so, [there were] lower yields with one of our main farmers, but [there was] plenty to be able to supply us for the year. So, [we're] able to weather those ups and downs." This commitment between partners allows for flexibility in navigating challenges like the weather. As the regional grain network has matured over the last decade and a half, grain quality has improved. As bakery co-owner Senders put it, "We've all been working out the bugs in our system, like our mechanical bugs, and the bread's better, the grain is better, the flour is better, everything's better."

Maine Grains took the initiative to increase the economic opportunity of its farm partners while supporting production practices that improve grain quality by marketing 'Crop Rotation' beans. To encourage its farmers to implement soil-enriching leguminous crop rotations (which, in turn, improve grain quality), Maine Grains began cleaning and selling the beans its farm partners were growing. Labeling these beans under the brand 'Crop Rotation' educates consumers about the importance of rotating crops in a farming system to support soil health, while providing both an incentive and a market for farmers to implement this practice.

A common strategy for assessing a new grain crop's "bake-ability" is for a processor to partner with a bakery to conduct bake tests. In both research and business settings, these partnerships are important for ensuring that a certain grain variety or a particular harvest will be usable for bakery customers. Ground Up Grain works with a local professional baker to test its farmers' grain quality every year; Farmer Ground Flour partners with its down-the-street neighbor, Wide Awake Bakery (where Oechsner is a silent part-owner); and Maine Grains works with retired professional bakers in the Northeast. Working with the same baker partners over the years creates a consistent and direct feedback loop for quality control and for helping the processors understand the qualities their bakery customers are looking for in a grain product.

Post-Harvest Handling

> I think there [are] a lot of people [who] say, "Oh, we need more infrastructure," which, we do need more infrastructure, but in the end . . . it's got to be more lucrative [for the farmer] to build that infrastructure.
>
> —*Sean O'Donnell, Maine organic farmer*

In localized grain value chains, a key component of post-harvest handling is the infrastructure needed for grain cleaning, drying, and storage. While commodity grain producers require their own extensive infrastructure, smaller-scale grain growers in these VBSCs face more difficulty in learning and troubleshooting cleaning and storage arrangements that suit their operations' budget and scale. Acquiring scale-appropriate equipment can be a challenge when most grain equipment and infrastructure is designed for large-scale, commodity agriculture. The scale of equipment that existed over 100 years ago when grain was still produced on a local scale is long gone in the U.S. June Russell, the director of regional food programs specializing in grains and staples at the Glynwood Center for Regional Food and Farming in Cold Spring, New York, described the beginning of the local grain movement in the Northeast: "[We] saw a lot of old, used equipment, like pre-1950s combines and grain cleaners, come out of old barns and get put back into use. That's definitely still a barrier—having scale-appropriate equipment. Not everybody needs a big, giant combine." Luckily, over time, farmers in the region have acquired better cleaning equipment and have set up better storage, which has improved the overall quality of food-grade grain.

This equipment and infrastructure challenge is pronounced for organic grain farmers, who typically grow a wider variety of crops in their rotations. One organic crop farmer explained,

> The challenge for small and particularly organic growers is we have to have a rotation of crops to manage weeds and nutrients and all sorts of other things. So, . . . we are often awful equipment-heavy for the size of our operation. It's like, "No kidding," you know, "there's an awful lot of steel around here that's expensive." But it's like, I don't know how to run the operation without it because we have this diversity in our business, you know?

This diversity supports soil health and provides multiple income streams for the farm business. Lambke sees this establishment of organic grain infrastructure building slowly over time in the Northeast: "[Certified] organic growers are slowly expanding acreage. We don't want a farmer to take too many big risks and then lose their shirt. We want them to grow gradually and smartly in a farm plan that makes sense for them. … Well, [growing organic grains] takes infrastructure investment—seeders harvesters, storage bins, dryers. That's a lot of money. … [This] is a long, slow game of building organic infrastructure." This gradual accumulation of infrastructure must happen in tandem with farmers securing their footing in marketing and sales, as borrowing money for infrastructure is difficult without a contract or a track record of sales.

Partnership Strategies

For farmers, having basic grain drying and storage infrastructure is necessary to meet food-grade grain specifications. Andy Morrill, a dairy and grain farmer in New Hampshire, learned the hard way that he could not let his food grain crop dry in the field. He has since set up storage bins and a grain dryer and learned to harvest slightly earlier: "[With]

the ability to put [the grain] through the dryer, we're able to get it out of the field before we're fighting as [many] disease problems or preharvest sprout issues." Additionally, because he made the investment in drying and storage infrastructure a few years ago, he was "able to salvage about 25 tons of wheat that otherwise probably would have been left in the field" during an unusually wet season. This infrastructure supports farmers in being able to produce food-quality grain—capturing the higher value from a food sale versus animal feed or cover crop seed—and hedge the risk of the weather.

Supporting farmers in accessing appropriate infrastructure is an important role of organizations like the Maine Grain Alliance and the Northern Grain Growers Collaborative in Vermont. The Maine Grain Alliance created an equipment and infrastructure program that gives farmers a "lifetime lease" on a piece of equipment that the organization formally owns. This allows the equipment to support Maine grain farmers while staying in the local grain network once a farm no longer needs it. The organization also offers technical assistance "mini-grants" of US$250 to US$1,000 to grain-based business owners in Maine, which, in recent years, have often been used for post-harvest grainhandling equipment. Noyes elaborates on the organization's approach:

> [We've] tried to meet each farm that we've been partnering with where they're at. Every farm is sort of in a different evolution of what they're doing, [has] different focuses, different needs. … [Rather] than say, "Everybody gets this thing," we try to take a really individualized approach to understanding what's the one thing with the funds that we had available that they … needed to be able to go to the next step.

While the Maine Grain Alliance is a separate entity from the flour mill, Maine Grains, the mill can point potential farm partners to the Maine Grain Alliance for support in acquiring the equipment and infrastructure they need to be able to eventually sell to the mill. As Lambke put it, "The Maine Grain Alliance obviously has been a key partner for Maine Grains the mill because, while we engage in different work, we support each other's missions."

The loss of scale-appropriate equipment for food-grade grains is true at essentially every point in the supply chain, including for flour milling. One company has filled some of this equipment gap by producing flour mills in a range of sizes using locally quarried Vermont granite to stone-mill flour, a practice that largely disappeared with the advent of roller mills in the late 19th century. New American Stone Mills, owned and founded by millwright Andrew Heyn, has a small team that produces these stone mills that serve regional processors like Farmer Ground Flour and Ground Up Grain in the Northeast, as well as over 100 bakeries, farms, restaurants, and food producers around the world.

Supply Planning

> [Usually], much of [the supply planning] for grain farmers occurs in the middle, like by grain … buyers and dealers. And … in the local food movement, those people don't exist, really. And so, … people have tried to [facilitate all] that within their shops. Amber does it, Andrea does it, Thor does it. And they've gotten better at it. And they've built relationships—but it certainly has taken them a lot of time to do that. And there's still uncertainty for all of them.
>
> *—Dr. Heather Darby, Extension Professor and Agronomic Specialist at the University of Vermont Extension*

As intermediaries, grain processors need to work with their partners on either side of the supply chain to plan for adequate grain supply while ensuring demand from end-users. Because these processors are relying on a small number of specific farm partners in these short supply chains, this planning often happens well before seed has been planted. These supply chain partners tend to come to agreement on the acreage or quantity of grain, grain variety, grain quality parameters, price, storage arrangement, and timing of delivery to the mill

in advance of the growing season, reducing uncertainty to the extent possible.

Partnership Strategies

Clear and consistent communication allows regional grain processors to manage grain supply planning. Stanley clearly defines and reiterates with Valley Malt's farm partners "the amount [of grain we] need, the price that it would be, the quality that is necessary, and who's going to take it and when" several times throughout the year: before the crop gets planted, during the growing season, right before harvest, and again around harvest time. In addition to this, 10 years ago the Stanleys began arranging annual field days at each of their partners' farms in the summer before harvest. "That's been really wonderful for our relationships, and for us just understanding what's going on each farm, and just getting that face time with the farms that we work with and their staff and … families." This in-person connection where the Valley Malt employees are able to meet their farm partners and see the grain in the field strengthens the company's partnerships with its farm partners and educates its malting and milling staff about grain production.

Planning for grain supply also requires extensive notetaking and coordination. Lambke has planning conversations with farmers in the winter before their spring groundwork and planting, "a year ahead of what [Maine Grains needs]." Lambke described the "matchmaking role" the mill plays, which entails working with growers to figure out who can supply which grains, keeping track of the commitments she already has with various farmers, and considering how those add up to meet their demand:

> A farmer will tell me that 30 acres of something is getting to be too small. … Well, I can punt that grain that I need over to the 30-acre farmer that has 10 free acres this year. And so that's not too small for them. … So, there's a little bit of matchmaking there to sort of match scale with demand and popularity of your product and keep enough things in the mix that achieve the mission. … [We're] going for biodiversity, … climate-adapted varieties, … good baking [and] cooking quality.

Russo similarly explained, "[It's] definitely not rocket science; it's just kind of spreadsheets," he determines, "we are going to want X number of pounds for the following year, and [we call] farmers: 'Who wants to put this in the ground?'" This "matchmaking" takes into consideration each farmer's scale, farming system, and available acreage that year as it relates to the needs of the processor and what they are already committed to purchasing from other growers.

Processors may or may not plan with end-users, depending on their relationship and the scale of product needed. Now that these processors have been operating for over a decade and have secured partnerships with farmers, the availability and quality of regional flour and malt in the Northeast has become much more consistent. Referring to another malthouse in the region, Brewmaster Jason Perkins at Allagash Brewing Company in Portland, Maine, who used almost 2 million pounds (or 1,000 tons) of Maine-grown grain in 2023, explained, "[Because] of the quantities and the predictability we give them, they're more or less malting for us, in a way. When they do a batch of grain in their malthouse, it's an 'Allagash batch' of grain that they're trying to hit our specifications [for]." In another example, Kate Galassi, the previous operations manager of Sfoglini Pasta Company in Coxsackie, New York, coordinated with Russo at Farmer Ground Flour for the year ahead: "[When] Greg is getting ready to purchase grain for the year and set up contracts [with farmers], he usually asks me for an updated annual forecast. I run all of my numbers of how much whole-grain pasta we've made in the last year, adjust based on current ordering volume … and send him an overall number." She adds, "We're in such a good routine at this point that my expectation of what they'll have and their expectation of what I'll order is very dialed in." Zack Robinson, co-founder of Short Path Distillery in Everett, Massachusetts, similarly described working closely with Stanley on "the timing of our single malt whiskey. …We try to plan it out six months in advance. We say, 'this is our goal for how many tons of grain we need and the cadence that we'll need them at.'" End-users operating at a smaller scale do not need this level of planning to

secure grain, malt, or flour from these regional processors.

This planning is almost "integrated," as Stanley put it, for processors, growers, and end-users who have been working together for many years. Rodney Graham, a New York organic grain grower for Farmer Ground Flour, stated, "They know me well. They know my farm operation well enough. Pretty much year in, year out, I've grown 70 acres and will continue to do that. … I'm really fortunate that they're in the area here. It's been great. Great people to work with." Similarly, Senders, co-owner of Wide Awake Bakery, said, "Surprisingly, [our communication is] actually so loose. I don't know. We just make stuff and then we give it to them and they grow stuff and give it to each other and grind it up. There's nothing to it." Stanley described one of her longest-standing farm partnerships as "a pretty well-oiled machine, that relationship." These partners have come to know each other's businesses and needs intimately through years of collaboration.

Contracts and Agreements

> With Christian and Andrea, they always come through; it's never been an issue. Contract or no, formal contract or informal contract. They've always done what they've said.
>
> —*Jeffrey Trout, New York grain farmer*

Grower and processor partners in grain value chains make different types of commitments based on their individual preferences, their relationship, and the institutional practices of the processor. Written contracts formalize the commitment between a grower and a processor and make clear the expectations of both parties, while verbal agreements feel sufficient to some partners. In both cases, the relationship-basis of these commitments means that partners tend to honor their end of the agreement, an important distinction from how commodity chains often operate.

Partnership Strategies

These supply chains all use forward contracts with at least some, if not all, of their farm partners. Forward contracts, which are agreements made in advance to buy or sell a specific quantity of grain at a predetermined price and date, are generally seen as beneficial to both the grower and processor. They create a commitment from both partners and outline specific terms and expectations before the sale of grain, and potentially before the grain is even planted. Tyler Murray, an organic grain farmer in New Hampshire, calls this "grow-to-order farming." This type of contract also typically sets the terms and expectations for pricing. In these contracts, the processor typically outlines how the grain will be priced depending on certain quality specifications, like protein level, falling number, and DON (mycotoxin) content. Tom Molloy, extension sustainable agriculture professional with the University of Maine, explained, "Historic price protects the buyer and the seller. If there's … a huge production issue and the wheat goes up to [US]$20 a bushel, there would be a protection in there for the buyer that the grower would not be able to 'gouge' the buyer and vice versa; so, as a seller, you might not get that [US]$20 bushel … but it goes both ways." Setting these terms in advance protects both partners. Spot contracts, in contrast, do not create the same long-term commitment between partners and do not allow for an advance agreement, as they are negotiated at the time of sale.

Purchasing by acre rather than yield (an "acreage contract" rather than a "bushel contract") reflects another form of risk-sharing between the grower and processor. In the case of a bad weather and low yield year, the grower is not expected to source additional grain from other farms to make up for the diminished yield. New Hampshire farmer Morrill provided an example: "This is a year where I had a commitment from a malthouse to buy 40 acres worth of grain. That commitment is 40 acres worth; there was no [requirement] on the tonnage or the bushels. Well, that 40 acres this year did not produce like it did a year ago. And everybody's kind of just been understanding of it."

In some cases, the processor provides or pays for the seed up-front as part of the contract or agreement with the grower. This is a way for the processor to make an up-front investment in the crop and show their commitment to purchasing grain from that grower. Processors may be more

likely to provide seed to farmers if they are looking for a heritage, ancient, or otherwise specialty grain variety that is uncommon and difficult to source. New Hampshire farmer Murray explains, "[If] they want 2,000 pounds of grain at a dollar a pound, [US]$200 would be the seed money when I plant it. … Then, once harvest comes to fruition in July, they would know what they have, and if it didn't come in as a good yield, they would lose that [US]$200." In other cases, processors can leverage their capacity to buy in bulk for a discounted price and pass it on to their grower partners. Making this gesture at the beginning of the season strengthens the commitment and partnership between the grower and processor.

Processors may require formal, written contracts as a strategy to avoid miscommunication or complications with some farm partners. Stanley described growers in their first few years of food- or malt-grade grain production as "high-risk." For her, having written contracts with these growers is especially important so that the partnership terms and grain quality specifications are outlined clearly. Stanley explains that it comes down to not yet having established trust:

> When you're in a new relationship with somebody … there's not a lot of trust established, so having a paper contract really does help. I would say the highest risk usually are those newer growers that we're working with, because it's just unknown how they operate, unknown how things will [go]. What you might assume somebody understands, they might not. What they think you might have said, you don't remember saying. Just normal kind of human communication breakdown can happen all the time. … With newer partners, sometimes you really don't know each other very well at all. So, trying to get everything in writing makes a lot more sense.

From the other perspective, farmers may feel more trust when a contract is in place. When a farmer works with a buyer for the first time, they also want assurance that the buyer will uphold their end of the agreement. Working through misunderstandings and continuing to make commitments to each other year after year is what builds this valuable trust between grower and processor partners.

In many cases, a verbal agreement is sufficient when there is strong trust between a grower and processor. The experience of overcoming challenges together, like bad weather, grain quality issues, and global supply chain disruptions from COVID-19 and global political unrest reaffirm partners' commitments to each other and build confidence that they will be able to work through more challenges together in the future, or, as millwright Heyn put it, "[weather] the ups and downs." Stanley stated, "[If] you have trust established with a partner … you know how to work through [miscommunications] because you've probably worked through some [difficulties] previously and gotten through it." Navigating challenges together builds trust, which strengthens the partnerships that persist through difficulties.

Pricing

> One of the challenges … is figuring out how to price the grain at what a baker can pay and what a farmer needs to make. Those are kind of tricky conversations to have. But more and more people are figuring … out how to make the economics work for both sides.
>
> —*Andrew Heyn, millwright and owner of New American Stone Mills*

For processors, determining a price that pays farmers fairly, covers the cost of processing, and is not "alienating for customers," as bakery owner Kerry Hanney put it, is a major challenge. Farmers and processors in these VBSCs are typically both "price-negotiators," meaning they work with each other to determine an appropriate price for the farmer's grain. Often, the farmer will set the starting price they need to cover their cost of production. Processors must then calculate how much they can pay the farmer while covering their lowest value market, which is often selling through distributors. Selling direct retail tends to provide the processor with the largest sales margin. Importantly, in these models, the savings derived from the reduced shipping cost from selling within the region allows for more money to end up in farmers' pockets.

Generally, there is more transparency in these grain value chains than in commodity supply chains. Long-standing, trusting relationships allow partners to talk about each other's costs openly and figure out a price that feels fair for both parties. This process for Stanley and Valley Malt's farm partners "is relationship by relationship and situation by situation. It's not very standardized," Stanley said. In addition to the farmer's cost of production (per acre or bushel), factors like increasing diesel prices, needing to purchase or fix equipment, the other crops the farmer is growing, and the availability of the particular grain variety play into this price negotiation. Dr. Julie Dawson, associate professor of plant and agroecosystem sciences at the University of Wisconsin-Madison, explained how this situation is different from pricing in commodity supply chains:

> [In] local/regional value chains, people are a lot more transparent about what things cost. If a farmer takes grain to an elevator, they may get docked on the price without knowing why, and then the purchaser is blending grain from many sources anyway. Commodity buyers are not helping the farmers make money. With a regional mill … they want the farmers to stay in business. They want to work with them. They want that supply. They're also often farmers themselves. They can have a conversation about, "Okay, how much work does this take me? How much work does this take you? What's a fair price?"

This transparency and supportiveness come from an understanding that these partnerships are mutually beneficial. Darby expressed, "It's exciting that people are willing to come together around risk, and pricing, and the needs of each other and their businesses. I mean, that's what makes this special."

Farmers who are more accustomed to selling through commodity or traditional markets may not transition seamlessly to selling through VBSCs. When grain prices spiked during COVID-19 and the beginning of the war in Ukraine, for example, Russo explained, "[We had to get] farmers to understand, like, 'Okay, yes, the market price is higher, a tiny bit higher than ours this year, but for the last 10 years, *our* price has been way higher. So, if you want to stick with us [Farmer Ground Flour] and have that stability in that relationship, that's up to you.'" Darby emphasized the importance of a "real commitment on both sides" to overcome the ups and downs in the broader market. She acknowledged that "a local food system [can] protect [partners] and provide them the resiliency, the ease in those hard times … but it would really take committed people that trust each other and believe in each other. Which, I think … happens over time." However, she continued, "A lot of that trust still hasn't been built for a lot of the farmers that we want to grow or could grow [food grains]. [Farmers] don't trust just anybody, so the real relationship [between partners] has to be built first."

End-users expressed a desire to maintain prices that are accessible to their customers. Baker Tim Gosnell of Standard Baking Company expressed that they "don't want [the bakery] to become so boutique-y that you have to be rich to buy bread. … We also want the farmers and Amber and everybody involved to get paid a fair price, too." While many end-users described the need to find this middle ground of pricing their products below a "boutique-y" rate but above the market rate to cover the cost of the added value, another baker felt strongly that the sustainability of the supply chain requires pricing to be comparable to any other similar product. Randy George, owner and baker at Red Hen Baking Co., conveyed,

> It's important to me that the pricing works for our business. We're not doing any farmers any favors if we can't operate a sustainable business that's going to stay in business and be able to continue to support them. That does mean that we have to be able to buy grain that is about the same price as what we could get from anywhere else (other organic sources). … We're in the same world as all the rest of the bakers and other food producers out there. If our bread has to be a few dollars more just because it's local, I feel strongly that it's not going to work out. … I really think that that's actually part of the sustainability equation in all of this.

JC Tetreault, co-founder and co-owner of Trillium Brewing Company, echoed this sentiment: "[You] can have your ideology, and … you can use an ingredient, but … the laws of supply and demand and price elasticity, those things all [still] apply." These businesses still operate within the conditions of the broader economy and need to attract customers and be profitable in order to function within these VBSCs.

The end-users' desire to maintain closer to market-based pricing directly conflicts with several farmers' opinion that the necessary price increase for their grain should be passed on to the customer. As one organic farmer put it, "to make a good product, it is a little more costly. So, I think [the processor] needs … to up their price a little bit. And if they're really offering a quality product, maybe the end user really would be willing to pay a little bit more." Reconciling a fair price for farmers with affordability for customers remains a challenge for some partners.

Partnership Strategies

Processors can show a commitment to local or in-state growers and to growers using certain production practices by providing price premiums. Seth Kroeck, farm manager of Crystal Spring Farm in Maine, explained that a malthouse in the state would give him a premium for his grain as long as it met the malt-grade specifications: "If we have a quality that's usable, then we'll talk about what it is he feels like he can afford. [The maltster] said, that said, he's happy to pay me a premium because … we're organic, we're [in-state], we're willing to tell our story." Offering price premiums supports these smaller-scale grain growers who struggle to achieve economies of scale.

End-users seemed overall comfortable as "price-takers," accepting the price of malt or flour that the processors set. Jonathan Stevens, co-owner and head baker at The Hungry Ghost Bread, shared, "I don't argue with [Andrea] about [pricing] because, first of all," he said in jest, "she's tough and she'll win. Second of all, I just need to trust her judgment. She does her job; I do my job." Robinson, co-founder of Short Path Distillery, similarly stated, "Well, she sets the price, and we pay it. How she arrives at [that] pricing is—she's transparent about it." For end-users, choosing to purchase the value-added and differentiated products through these VBSCs is a decision that represents their social, environmental, and economic values. Allison Reid, co-owner of Scratch Bakery in South Portland, Maine, explained, "There's so much more than price going into that bag [of flour] for us to decide to use that product. You know, it's education for our customers … it's education for our team. It's supporting a local company [Maine Grains], and a lot of local people that work there. So, it goes beyond the price. And I think that's the kind of stuff that you can't put a price on." Providing education and communication around the values embedded in their products is a critical step in selling these products to customers and justifying their higher price.

Discussion

Our study demonstrates how partnerships between VBSC actors develop into committed and often interdependent farmer-miller-baker and farmer-maltster-brewer relationships, and how the close nature of these partnerships is crucial to overcoming supply chain challenges and sustainably functioning as grain value chains. Interorganizational trust has been noted as a key component of successful VBSCs, which is "generated and maintained [by] reliability, fairness, competence, goodwill, loyalty, and respect for the risks and vulnerabilities associated with business models based on interdependence" (see Stevenson & Pirog, 2008, p. 125). Our study demonstrates that a high level of trust and interdependence is essential for overcoming the many barriers faced by grain value chain participants. Partners build trust by following through on their commitments to one another and collaboratively working through unexpected challenges with the understanding that their individual success is largely dependent upon the success of their partners.

Through years of collaboration, many supply chain partners became not only professionally, but personally, invested in each other's businesses. They described how their professional relationships often evolved into close personal friendships, and these friendships contributed to their trust in and commitment to one another. The personal

closeness of these relationships mirrors Saulters et al.'s (2018) finding of "fairness as relationships," or fairness in the supply chain being viewed and exercised as the way processors have developed and maintained relationships with their partners over time. These relationships were more collaborative and reciprocal in nature rather than transactional as in commodity supply chains, allowing farmers some amount of negotiating power.

Despite working closely with the same partners year after year, our study shows that these grain value chains are not linear, but rather dynamic and complex, making up a broader regional grain network. Previous research has reflected this finding that, rather than operating as distinct, linear supply chains, VBSCs resemble more of a network (Feenstra & Hardesty, 2016; Feenstra et al., 2011; Hardesty et al., 2014). In this regional grain network, many farmers sell to multiple regional processors, some farmers sell directly to end-users like bakeries and breweries, and other farmers directly retail their own grain or flour. Regional processors may even occasionally purchase grain from each other. Lambke emphasized the ways her vision was counter to the idea of a linear supply chain: "I've been more vocal about my recoil around the terms like 'supply chain' and 'value chain.' It implies linear. That, I don't think, is helpful. … I think, thinking of grain systems as clusters of relationships is helpful. And then you'll find you're welcoming in new people that you didn't think you'd be welcoming in." Our study of these partnerships illustrates how the complex, dynamic, and relationship-based nature of VBSCs is critical to their effectiveness, in contrast with the more linear structure and transactional nature of conventional commodity supply chains.

A key aspect of this network is the role of value chain coordinators. Throughout the study's interviews, the owners of the three grain processing companies were praised for their level of initiative, which went far beyond running their own businesses. The Wallace Center at Winrock International defines value chain coordination (VCC) as "a set of roles that foster soft infrastructure development … in the form of skills, competencies and relationships" (2019, p. 1). As detailed in the Wallace Center's "Value Chain Coordination Quicksheet," these individuals played many of the "primary" and "enabling" VCC roles, such as providing technical assistance, playing market-matchmaking, and organizing convenings and events, to support the VBSC as a whole. Without this level of investment in their partners' success, the grain processing businesses would not have been sustainable. Additionally, university Cooperative Extension, researchers, and nonprofit organizations (like GrowNYC, the Maine Grain Alliance, the Northern Grain Growers Collaborative, and the Northeast Grainshed Alliance) were critical in supporting the development and functioning of the regional grain network, especially in hosting events for knowledge-sharing and networking where individuals at different points in the supply chain could meet and form new partnerships. This study further demonstrates that developing social connections (the "soft infrastructure") is essential to the functioning of VBSCs and their ability to take risks, develop novel strategies, and work through challenges.

Current Related Work and Policy and Program Implications

These examples of partnership strategies could offer guidance for VBSC development in other sectors or places. They have already inspired similar models in other parts of the U.S. Northeast and Midwest, including grower-owned mills, a farmer-initiated grain center, and craft malthouses. There are currently over 60 craft malthouses and about as many artisan flour mills in the U.S., most of which were established in the time since the formation of the three grain value chains in this study.

Nonprofit organizations and university extension groups are developing technical assistance reports on topics like food-grade grain production (Cornell College of Agriculture and Life Sciences, n.d.; Hallweaver, 2017; Williams et al., 2023) and post-harvest grain handling (Artisan Grain Collaborative, n.d.-b; Noyes, 2020), and are bringing stakeholders together to support partnership development. The Artisan Grain Collaborative even created a documentary series called *Grain Chain Connections*, which demonstrates what some of these collaborative partnerships look like. It asserts, "Trusting relationships form the base of a

thriving regional grainshed" (Artisan Grain Collaborative, n.d.-a, para. 1).

Support for VCC is critical for the development of VBSCs and regional food systems. One example of how this work is being supported is through the Resilient Food Systems Infrastructure (RFSI) program, a U.S. Department of Agriculture (USDA) program that invests in equipment and infrastructure for the middle of the food supply chain. Through RFSI, the participating 56 states and territories could allocate a portion of their RFSI grant funds specifically to advance VCC efforts. This option represents the USDA's recognition of the importance of developing the "soft infrastructure" in these supply chains and networks. The Local Farms and Food Act, a bill introduced in both the House and Senate in April 2023, would further institutionalize USDA support for this coordination work to "meet critical and under-supported needs for local food system equipment, value-chain coordination, and business technical assistance" (Zaks, 2023, para. 4). Future USDA and state programs should similarly invest in VCC activities in tandem with providing equipment, infrastructure, marketing, and other support to farmers and food producers.

Conclusion

Our findings from this multiple-case study of three grain value chains in the Upper Northeast offer insights into the nature of VBSC partnerships and the ways in which partners work together to overcome challenges. While the structural challenges and opportunities the three grain value chains face are the same (or very similar), the relationships and the partnership strategies they employ vary. This research shows how relational factors, such as shared values, fairness, and trust, intertwine with structural factors like infrastructure, contracts, and pricing, and how the intertwining of these factors is likely vital to the functioning of VBSCs. This creates resiliency that helps these partnerships adapt to the challenges inherent to grain value chains and promotes the kind of systemic food system change these partners are working toward. Overall, developing committed, trusting, and interdependent partnerships that see value in one another's success is key to overcoming the challenges facing grain value chains.

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