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An examination of adaptations of direct marketing channels and practices by Maryland fruit and vegetable farmers during the COVID-19 pandemic

THE IMPACT OF COVID-19 ON FOOD SYSTEMS
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Inter-institutional Network for Food and Agricultural Sustainability

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Abstract

This study explores the impacts of the COVID-19 pandemic and the Maryland stay-at-home order on fruit and vegetable farmers in Maryland. Focusing on farms' direct-to-consumer marketing channels, we aim to characterize the diversity of farm responses and identify practices that facilitated adaptation. This research is grounded in the socio-ecological systems framework, which emphasizes

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the interconnection between social and ecological systems and characterizes the dual-driving forces that impact food producers and their livelihood. The study team conducted interviews with 20 Maryland farm owners/managers who grow and sell produce. The semistructured interviews included questions relating to production practices, sales and marketing, and resilience. The interviewer followed up with probes to understand the dimensions of response diversity and adaptive capacity. Interviews were transcribed verbatim, and responses were analyzed using the framework approach. In the context of a global pandemic, community supported agriculture (CSA), farmers markets, and pick-your-own channels provided a high degree of stability and financial security. No farmer reported relying solely on intermediated markets (e.g., restaurants, grocery stores, institutions). Distribution channels that incorporated an online marketplace offering prepacked pre-orders were a notable strength of highly adaptive Maryland produce farmers. Farmers reported that expanding established CSAs was an important method for reallocating produce originally intended to be sold to reduced/terminated marketing channels. Common challenges among farmers included increased administrative workload, concerns associated with raising food prices during a crisis, and environmental concerns about the use of additional packaging. We describe a range of adaptive behaviors that aided farmers in withstanding shocks.

Keywords
COVID-19, Local Food Systems, Resilience, Direct-to-Consumer (DTC) Marketing, Response Diversity, Adaptive Capacity, Stay-at-Home Order, Pandemic

Introduction

The COVID-19 pandemic that began in 2020 and subsequent government restrictions on movement significantly disrupted U.S. food supply chains, resulting in reduced food availability and access (Laborde et al., 2020). In Maryland, restrictions on movement were formalized on March 30, 2020, when presiding Governor Larry Hogan issued Executive Order No. 20-03-30-01, requiring all non-essential persons to stay home. Prior to the pandemic, consumer preference for local food was primarily motivated by perceived quality, superior taste and nutritional value, social and environmental impact, and desire to support the local economy (Brekken et al., 2017; Feldmann & Hamm, 2015; Martinez et al., 2010). Recent research suggests that public concern about transmission of the COVID-19 virus has increased consumer preference for grocery store pick-up and delivery options (Grashuis et al., 2020) and for food grown by local farmers (Schmidt et al., 2020; Severon, 2020).

The pandemic has heightened concerns about the capacity of food systems to ensure food security. The United Nations recognized food as a universal human right in 1948 and later introduced the term "food security" in 1974 (Chen et al., 2015). Facilitated by the increase in global trade and desire to stabilize food production, prices, and consumption (Bellows & Hamm, 2002), the following period was characterized by deepening of vertical integration of food production. In response to this change, the 1990s were marked by increased interest in countering this trend and improving food system resilience through re-localization and the community food security movement (Bellows & Hamm, 2002). Interest in local food systems continued to grow during the early 2000s, indicated by increasing sales through both direct-to-consumer (DTC) and intermediated marketing channels (Low et al., 2015; Martinez et al., 2010). However, in the last decade, national data suggest that the number of farms selling directly to their local communities has begun to decline (O'Hara & Benson, 2019). DTC channels are advantageous because they allow farmers to sell directly to the final consumer (e.g., farmers markets, community supported agriculture (CSA), pick-your-own), while intermediated channels facilitate direct sales to local institutions (e.g., restaurants and school systems). Most small local farms sell only DTC, but an increasing number combine DTC and intermediated sales channels (Low et al., 2015). For this reason, we can consider direct marketing channels to be any combination of DTC and/or intermediated channels reported by local farmers in Maryland during the COVID-19 pandemic.

Direct market sales are most prominent among small to medium-sized farms producing fruits and

vegetables near urban centers in Northeast states (Low & Vogel, 2011) and are influenced by the population density of the surrounding areas (O'Hara & Lin, 2020). As with other states on the Eastern Seaboard, Maryland farms are primarily small to medium-sized; the average U.S. farm is 443 acres while the average Maryland farm is 161 acres (U.S. Department of Agriculture National Agricultural Statistics Service [USDA NASS], 2019a). According to the 2017 Census of Agriculture, an estimated 11% of Maryland farmers engage in direct market sales (USDA NASS, 2019b). However, this figure could likely be larger because smaller peri-urban and urban farms are disproportionately not captured by the Census of Agriculture (Rogus & Dimitri, 2015; Young et al., 2017; Young et al., 2018). Research on direct marketing is important because, compared to traditional marketing channels, it is associated with higher business survival rates among small and beginning farmers (Low et al., 2015). This may be in part because direct market sales return a larger share of the food dollar back to the farmer than traditional marketing channels do (Myers, 2017).

Focusing on the farms' direct market sales, we aim to identify and characterize the diversity of farm responses to the COVID-19 pandemic and to identify practices that farmers implemented to improve their resilience. First applied to ecological systems, resilience research has been further developed by social science researchers to address social systems (Adger, 2000). Manyena (2006) skillfully documented the unwieldy number of definitions for resilience and identified a progression from outcome-oriented language to a more process-oriented language. Opting for the latter, we define resilience as the "capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (Walker et al., 2004, para. 7). Applied to our study population, resilience is the ability of an individual farm operation to continue food production and distribution to customers in light of the ongoing COVID-19 pandemic.

Research on resilience is frequently grounded in the socio-ecological systems (SES) framework, which emphasizes the interconnected nature of social and ecological subsystems (Adger, 2000; Folke et al., 2010; Gallopín, 2006; Hodbod & Eakin, 2015). Adger (2000) argues that an SES framework is "particularly relevant for social groups or communities that are dependent on ecological and environmental resources for their livelihoods" (p. 347). This point is salient when thinking about the classification of farmers as "essential workers," as the timing of the Maryland stay-at-home order coincided with the start of the 2020 harvest and persisted throughout the growing season. While a great deal of resilience literature attends to developing metrics to measure the *amount* of system resilience (Cutter, 2016; Food and Agriculture Organization of the United Nations, 2016), we aim first to characterize actions and business decisions made by farm owners during the COVID-19 pandemic. Two constructs from resilience literature—response diversity and adaptive capacity—are relevant to our study and are used to examine the features of highly resilient farm operations.

Response diversity explains the fact that individuals or organizations do not respond in the same way to changing circumstances (Kaseva et al., 2019; Leslie & McCabe, 2013). In the context of the COVID-19 pandemic, diversity could take the form of one farm choosing to shut down all but one existing direct marketing channel, while a neighboring farm adds a new channel. Variety in response is crucial because while some response diversity is advantageous, some degree of redundancy also contributes to system resiliency (Clancy & Ruhf, 2010; Miller et al., 2013). Adaptive capacity refers to the actual assets, social safety nets, and personal and institutional knowledge that facilitate response action and serve as a buffer against abrupt changes (FAO, 2016; Kaseva et al., 2019). In the context of COVID-19, examples could be a tech-savvy young farmer starting an online store and an older farmer starting a farm stand. Both practices may be effective, but they are facilitated by differing assets, skills, and knowledge. Our research contributes to the existing literature on food system systems resilience by taking a step back, starting at the individual farm level, and characterizing the diversity in farm responses and

adaptations that were specifically motivated by the pandemic.

Local farms' direct marketing practices warrant greater study because small to medium-sized farm operations have smaller profit margins than large farms, which makes them more vulnerable to the impacts of climate change and other events (Department for Environment, Food and Rural Affairs, 2013; Miller et al., 2013). Within food system resiliency research, food production and climate change remain the two primary areas of focus (Miller et al., 2013). However, developing more nutrient-dense crops and resilient methods of production are inconsequential if the primary system by which food is delivered to the consumer fails to function under future shocks. The purpose of our research is to improve the understanding of how small and medium-sized fruit and vegetable farms in Maryland responded during the initial months of the COVID-19 pandemic. Two research questions guided this study: (1) What changes to existing direct market sales channels occurred during the pandemic? (response diversity); (2) What specific practices did farmers use to modify existing or newly added direct market channels? (adaptive capacity). Given the research objectives, and the complexities around responses, the study used qualitative methods.

Applied Research Methods

Recruitment

We used purposive sampling to select farm operations of varying county locations and production acreage. We used the USDA Census of Agriculture farm definition (>$1,000 in sales) as the basis for eligibility criteria. Eligible farms were in Maryland and had produced fruits and/or vegetables during the previous year (2019). There was no minimum or maximum farm size (acreage) required for eligibility. Furthermore, farms were not excluded if they sold produce in multiple states (e.g., Virginia, D.C.) or had supplemental non-produce income (e.g., meat or poultry, dairy, honey). Farms were represented by either their owners or produce managers.

One hundred sixty-two eligible farm businesses were identified through existing partner networks of the authors and internet searches. Networking with Farm Alliance of Baltimore members supplemented online recruitment efforts. Study recruitment occurred during June–August of 2020. We aimed to recruit a variety of farms, from as many as possible of Maryland's 24 counties. All study recruitment occurred via email using a standard form letter sent from the primary researcher. Eligible farms that did not respond within 1–3 weeks were contacted a second time by email. Recruitment efforts were halted when two outreach efforts per farm were met with no response.

In total, 111 eligible farms were invited to participate. Of those, 6% (n=7) declined to participate either because they did not have time (n=4) or had stopped selling produce in recent years and failed to update their websites (n=3). The majority (n=84, 76%) did not respond to either of the two recruitment emails. Twenty-three farmers (19%) agreed to participate, and an interview time was scheduled. Of those, three failed to attend the interview, resulting in a final participation rate of 18% (N=20). Four farmers were members of the Farm Alliance of Baltimore, a collaborative of urban farms in Baltimore City, Maryland. The eligibility criteria and recruitment process produced a group of participating farms that each had one or more direct marketing channels. Farmers were compensated US$50 for participating in the interview. Each participating farm had one representative participate in the study.

Data Collection

Interviews with 20 Maryland farmers were conducted between June 11 and August 10, 2020, by a single researcher (G.B.). The interview guide included 31 questions and additional probes. To prevent the risk of COVID-19 transmission between participating farmers and the researcher, all data collection occurred via the Zoom videoconferencing platform or by phone (per farmer request). Study protocols were reviewed by the Johns Hopkins University Institutional Review Board. All participating farmers provided informed oral consent prior to the interview and agreed to be recorded.

The researcher administered a demographic questionnaire consisting of closed-ended questions.

Responses were collected and managed using REDCap electronic data capture tools hosted at Johns Hopkins University Bloomberg School of Public Health (Harris et al., 2009). The questionnaire collected information on farmer demographics and 2019 farm business characteristics. If specific figures were not determined during questionnaire administration, the study team followed up by email to confirm or complete responses.

Eighteen interviews (90%) were recorded and transcribed verbatim using NVivo (Version 12) qualitative data management software. Two interviews were not recorded due to technical failure. The researcher (G.B.) kept notes for each interview and completed a voice memo recounting the conversation, which was then transcribed. The average length of an interview was 61 minutes (range 39–93 minutes). Recruitment of study participants and data collection concluded after the primary researcher conducted 20 interviews. The research team reviewed the responses by theme and collectively determined that saturation had been met.

Analysis

Quantitative data from the surveys are reported using descriptive statistics; analysis was conducted using Excel. Qualitative data analysis was guided by the framework approach, a five-step qualitative data analysis plan appropriate when research questions are identified *a priori* (Pope et al., 2000). The process is inherently iterative, resulting in researchers moving forward and backward across the five steps. Step 1, data familiarization, was completed by one researcher (G.B.), and accomplished by reviewing written notes, completing a reflective memo, and editing and correcting the interview transcripts. Step 2, identifying a thematic framework, was initially informed by predetermined themes as outlined in the in-depth interview guide: (1) production practices, (2) sales and marketing, (3) adaptation and resiliency. All of step two was accomplished by the two primary researchers (G.B., S.L.). Emerging themes were added to the thematic framework, including (4) response diversity and (5) adaptive capacity.

During the remaining three steps, the two primary researchers consulted regularly with the larger research team to make determinations as to how best to categorize and display the data. Steps 3 and 4—indexing and charting of quotes—involved assigning each quote to one or more of the five themes while keeping the context of the quote and the individual farm intact. Data were coded using Nvivo 12. During the fifth and final step, mapping and interpretation, both researchers focused on identifying the range of individual farm actions and experiences as they relate to response diversity and adaptive capacity. Illustrative quotes were discussed and highlighted to substantiate the findings. Finally, we report on and discuss the breadth of the findings, highlighting displays of resiliency by the farm and farmer.

Results

Farmer and Farm Characteristics

Eleven farmers were female (55%), and the majority owned the farm/business (70%) (Table 1). Farmers ranged in age from 25 to 60 years old (mean=41.5 years). Reflecting the wide age range, total years of farming experience ranged from 1 to 40 years (mean=14.4 years). Most total years of farming experience occurred at their current farm; employment duration ranged from 1 to 35 years (mean=10.6 years).

One-third of farms (n=7, 35%) are USDA-certified Organic, although a few more reported following organic practices. The average farm size was 17.0 acres (SD=31.1) and the average 2019 harvest was nearly 20,000 pounds of produce in 2019 (SD=27,573). The average revenue reported in 2019 was $161,857 (SD=US$289,878). At four farms, the participating farmer was the sole employee. The remaining farms (n=16, 80%) relied on some combination of additional full-time employees, part-time employees, seasonal workers, and/or volunteers.

Farms were located in 11 of 24 Maryland counties (Figure 1). The number of farms was greatest in Baltimore City county (n=4, 20%), followed by Baltimore County (n=3, 15%). Two farms each from Frederick, Howard, Prince George's, and St. Mary's counties were also represented.

The qualitative data were collected to answer our two main research questions, regarding the

Table 1. Characteristics of Farmers and Farms (*N*=20)

	Mean (SD)	Median (range)	*n*	%
Farmers				
Sex				
Male	--	--	9	45
Female	--	--	11	55
Farm/Business Owner				
Yes	--	--	14	70
No	--	--	4	20
Other: Own the business, not the land	--	--	2	10
Age (years)	41.5 (13.1)	38.5 (25.0, 60.0)	20	--
Farming experience (years)	14.4 (10.6)	11.0 (1.0, 40.0)	20	--
Employment at current farm (years)	10.3 (9.5)	8.0 (1.0, 35.0)	20	--
Farm Operation (as of 2019)				
Certified organic	--	--	7	35
Farm size (acres)	17.0 (31.1)	3.0 (0.2, 120.0)	19	--
Produce harvested (lbs.)	19,353 (27,573)	1,200 (400, 70,000)	9	--
Farm/business revenue (US$)	$161,857 ($289,878)	$128,000 ($1,200, $1,200,000)	16	--
Employees (#)				
Full-time	3.0 (3.9)	2.0 (0.0, 17.0)	20	--
Part-time	5.6 (12.6)	1.0 (0.0, 48.0)	20	--
Seasonal workers	3.4 (7.2)	0.0 (0.0, 30.0)	20	--
Volunteers	47.4 (141.6)	1.0 (0.0, 600.0)	20	--

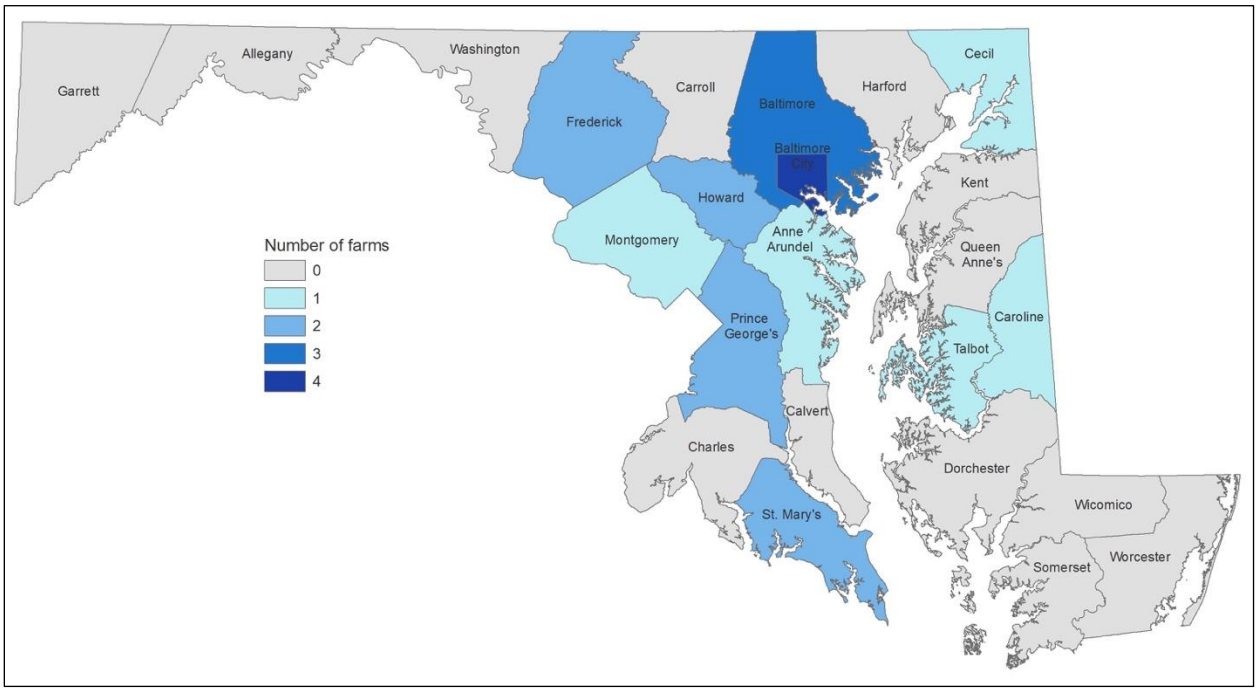
changes made to direct market sales channels and the marketing practices used to modify existing or newly added channels. Questions were designed around three aforementioned themes: (1) production practices, (2) sales and marketing, and (3) adaptation and resiliency. Following the framework approach's five-step analysis plan, the team reviewed and organized data to understand how farmers assessed their operations in the context of the pandemic and the Maryland stay-at-home order, and made decisions about which marketing channels they would stop or continue (with or without modification) and which new channels they would start. Data was organized to show the range of marketing practices developed or adapted to address shifting consumer preferences and the changes in direct marketing channels. Results are presented with demonstrative quotations and the corresponding farmers' assigned identification number (ID).

Direct Marketing Channels

Farmers reported using four primary direct marketing channels in 2019 prior to the pandemic: community supported agriculture share programs (CSAs), farmers markets, pick-your-own, and sales to restaurants. (In CSAs, the customer purchases in advance a share of the farmer's expected yield for the season or an otherwise specified duration of time, then receives the produce weekly when harvested (Low & Vogel, 2011)). Farmers reported selling produce through one to four established channels. Ranked in order from most to least common: 35% (*n*=7) of farms reported two marketing channels, 30% (*n*=6) reported three, 30% (*n*=6) reported only one, and 5% (*n*=1) reported four.

Trends as to where farmers sold produce emerged through the number of channels reported.

Figure 1. Participating Farm Locations by County in Maryland



For example, CSAs were the most common among farmers who sold through one marketing channel. For farmers with two marketing channels, the combination of farmers market and restaurants sales occurred most frequently. For farmers with three marketing channels, the majority reported engaging in a combination of CSAs, farmers markets, and restaurants. Notably, no farmer reported relying solely on intermediated markets (e.g., restaurants, grocery stores, institutions).

Nearly all participating farm operations (95%, *n*=19) remained in business and were still distributing food to customers at the time of the interview. The exception was a young farmer who held a second job in the restaurant industry during the winter months and elected midway through the harvest season to exit farming to pursue landscaping, primarily for economic considerations.

The remaining farmers reported not making any substantive changes to the fruit and/or vegetables produced because of the pandemic. Several stated that this was because of having finalized their crop plan during the previous winter, November 2019–January 2020. Rather, farmers had much to say about changes made to where and how they distributed their harvested produce on account of COVID-19 and the stay-at-home order. As Farmer 16 put it aptly: "The plants don't care. You know, they grow whether it's COVID-19 or not."

1. Response Diversity

In response to COVID-19, nearly all farmers reported making some degree of modifications to the marketing channels *where* they sold produce. However, farmers remarked that the timing of the pandemic made adapting their existing marketing channels easier than if the pandemic had come at any other time of the year. More specifically, when the pandemic first began affecting daily life in Maryland in March 2020, farmers were primarily tending their crops in the fields. Only a small minority of farmers were actively harvesting and selling produce, while the majority were focused solely on growing produce:

> …the timing actually worked out really well in our favor. You know, if it [the pandemic] had hit a month later, or something like that, we would have had to make drastic changes. [ID-12]

> If it [the pandemic] had happened in the mid dle of the summer, I think for many people [farmers] it would have been like a harder, you know, a harder ship to turn. Because for most farmers, regardless of what you grow, it [the pandemic] was kind of in the beginning or in a bit of a lull. So it's like, you know, you could change things. [ID-01]

Precisely because COVID-19 occurred at the start of the season, farmers could clearly demarcate between which market(s) they *had planned* to use and then which market(s) they *did* use. There were clear trends in the types of channels farmers reported stopping (or not starting), continuing—with and without modifications, and starting to use during and after the stay-at-home order. In general, farmers reported continuing or starting DTC channel(s), particularly CSAs and farmers markets. Conversely, the majority of farmers reported stopping existing intermediated channels (e.g., restaurants) (Figure 2).

Figure 2. Farmer Responses to the COVID-19 Pandemic by Direct Marketing Channel

	Customer Channels	Stopped (or did not start)	Continued (with or without modifications)	Started
Direct to Consumer (DTC)	**CSA**	**1 farm was unable to start** • COVID-related production delays	**7 farms modified distribution** • Changes to pick-up time, location, and/or method (6) • Intended to start charging but continued with donations (1) **4 farms modified production** • Extended season (1) • Stopped work exchange (1) • Crop increase/decrease (2) **2 farms reported no changes**	**2 farms started** • Response to restaurant closures (1) • *Diversification (1)* **1 farm resumed** • Added a 4-week offering
	Farmers Market	**3 farms stopped selling** • Disliked COVID-19 market policies (1) • Half season; quit farming (1) • Increased nonproduce commodities (1)	**All farms (14) modified distribution** • Changes to farm stand and sales transactions **2 farms experienced temporary disruptions** • Location changes, delays in opening	**1 farm started** • Response to restaurant closures
	Pick-Your-Own	**3 farms stopped** • Temporary; later reopened (2) • Permanent; friends and family only (1)	**2 farms continued, with no major changes** • County permitted pick-your-own (1) • Prioritized community member access (1)	**0 farms started**
Intermediated	**Sales to Restaurants**	**6 farms stopped selling to *all* existing venues** • Specialty items (1) • Restaurants fully shut down (5) **1 farm was unable to start** • Lacked buyers	**2 farms continued selling to select existing venues**	**1 farm started selling to new venues** • Obtained through word of mouth

Notes: *Italics* denote an action that was planned prior to the COVID-19 pandemic.
Number in parenthesis indicates number of farmers reporting this response.

The following section provides quotes from select farmers which demonstrate their motivations for stopping, continuing, or beginning to sell produce within a given direct marketing channel. Additionally, relative advantages and challenges of each channel are discussed.

1.1 Community Supported Agriculture (CSA)

CSAs were a reliable distribution channel, despite the pandemic, due to heightened customer demand. Thirteen farmers continued their CSA offerings. Three started a CSA offering, and one farm was unable to start a CSA due to pandemic conditions. Regardless of farm size, location, and business age, all farmers who offered a CSA sold out, either for the first time ever or for the first time in recent years:

> I was afraid that we wouldn't have anybody participate. … But when people couldn't find food, they started to panic in a way that I've never witnessed. And we filled that CSA. I've now started to turn people away. [ID-02]

Unusually high customer demand accounts for why one farmer, who had discontinued her CSA in 2019, felt compelled to revive this distribution channel and offer an abbreviated four–week long CSA:

> You know, in January 2020, my plan was I'm just bringing to [farmers] market. I'm not going to be doing the CSA. … [But then] I just had people like emailing me about it. Or calling me, or texting me, like every day. [ID-17]

Another farmer had intended to start charging for CSA shares prior to the pandemic but decided to continue providing CSA shares to customers at low or no cost. The decision was informed by conversations with numerous concerned customers, reflecting the tension in communities between food security and financial security brought about by the pandemic:

> They're like, "What if I give you a hundred dollars? Would I [be] guaranteed food?" I'm like, "You don't have to do that. Just hold on to your money. You save every dime that you got." [ID-06]

CSAs were well-suited for the disruption caused by a pandemic because customers can often self-serve, and farmers are in control of the pick-up location and time. Overall, CSAs remained a highly stable distribution channel during the pandemic because of the heightened customer demand.

1.2 Farmers Market

Farmers markets proved to be another highly stable distribution channel. Fourteen farmers continued with this marketing channel, while two stopped selling to farmers markets and one began selling at markets specifically because of the pandemic. Four of the fourteen farms participated in an aggregated farmers market stand managed by the Farm Alliance of Baltimore. For all farmers, a reported disadvantage of this marketing channel was the high degree of uncertainty during the initial few weeks of the stay-at-home order about when farmers markets would reopen and what new policies vendors would have to implement. This channel required arguably the greatest degree of modifications. All farmers reported changing their table setup, packaging, and/or payment mechanisms:

> So we changed the whole market layout. The way that we do the stand. We changed our packaging to be much more plastic intensive. We changed . . . initially we said no cash back. So it was either exact change or [credit] card. So we've done a lot more cards processing. [ID-17]

Setting aside the high degree of uncertainty at the start of the pandemic, farmers markets became a reliable distribution stream, offering vendors a broad customer base and increased sales:

> People became re-acquainted with farmers markets. And the cool part for us is it was pretty packed. And so it was like, here you go. Get out. Here you go. Get out. [ID-02]

Most farmers who sold at farmers markets prior to the pandemic continued, with reasonable

adaptions to booth setup and customer transactions to facilitate social distancing. While farmers had less autonomy in this distribution channel than with a CSA, markets remained a viable way to market their products during the pandemic to many households.

1.3 Pick-Your-Own

Three of the five farmers (60%) offering a pick-your-own operation prior to the pandemic temporarily or permanently stopped this marketing channel. For those who had produce ready to harvest when the stay-at-home order was in place, public safety measures were prioritized over harvesting the produce. Once the order lifted and more was known about how COVID-19 was transmitted, farms opened with safety precautions:

> And you're faced with this like, do we let the strawberries rot? Or do we invite people to U-pick them? And so then I had to go through this really long, sort of tortured process of getting permission [from employer] to let my customers U-pick the berries. … They [the employer] were anxious about having too many people in the field at once. Having people without masks. … I came up with a sign up system. And some rules. [ID-11]

Two farms offering pick-your-own continued without limiting or delaying public access. One farmer located in an urban center prioritized access to nature and food security for members of their local community:

> … We have a good many neighbors who just know about the farm and come pick food themselves … when I'm there, when I'm not there, they can just come by. [ID-15]

The other farmer who managed a large pick-your-own operation did not have to make major modifications because the crop was not ready to be harvested until after the stay-at-home order had ended. They were met with drastically increased customer demand, characterized by many first-time customers:

> So on a typical weekday … we would see anywhere from 200-400 cars come through the property. … Now, it's been more like 500-700 cars on a daily basis. … The weekends have been, you know, pretty much tripled for us. [ID-12]

Pick-your-own marketing channels stalled during the initial months of the pandemic, as farmers were uncertain about how to implement appropriate safety precautions. However, as more was learned about the transmission of COVID-19 and outdoor activities were encouraged over indoor activities, farmers who did have established pick-your-own channels resumed partial or full capacity. No farmers who did not offer pick-your-own prior to the pandemic launched this marketing channel during or after the lifting of the stay-at-home order.

1.4 Restaurants

The greatest disruption in direct marketing channels occurred in the restaurant sector. Six farmers who sold to restaurants in 2019 lost all restaurant customers due to the pandemic. Most of these farms had another marketing channel—most commonly a CSA or farmers market—and reallocated product intended for restaurants to these channels. Only one farmer of the six reported establishing new restaurant customers. Another farmer provided a potential explanation for why restaurants had not resumed purchasing product from local farms:

> For the most part, I was selling stuff to them [restaurants] that would be featured on, say, a menu special. And now a lot of restaurants, even though they're still doing business, they've really pared down … focusing more on just kind of basic menu essentials and getting people back in the door. [ID-07]

Two farmers reported continuing to sell to some but not all existing restaurant customers. One went from approximately 40 restaurant customers to four, and the other went from seven restaurant customers to one:

> Only one [restaurant business] weathered the storm pretty well, and that's because that owner and chef of the restaurant, basically laid off most of their workers, and just started running a grocery store out of his place, with our foods. … He was very adaptive because he's old. He's like me, he's adaptive. [ID-19]

This perspective on changes within the restaurant industry reflects a general trend among farmers; many keenly observed how other food production businesses were responding and likely made mental notes about what appeared to work, or perhaps not work.

1.5 Alternative Channels

Farmers also reported distributing food via three other channels: (1) donations, (2) sales to other farms, (3) sales to institutions and organizations. Prior to COVID-19, three farmers reported consistent food donations, either directly to individual community members or to food pantries. Another three farmers reported incorporating food donations into their weekly food distribution regimen in response to the pandemic. Farmers motivated by food security concerns in Maryland seemed to be more easily able to act on their intention to donate because of perceived increased need and the establishment of new and conveniently located donation sites supported by numerous organizations:

> I felt very strongly that I didn't want to put food in the compost pile this year. And so I made kind of a conscious effort to try to donate surplus. [ID-07]

Another produce distribution method reported by four farmers was direct sale of produce to another farm, which was then used for their CSA or restaurant sales. For three of the four farmers, this marketing channel was a normal practice and not related to the pandemic. One farmer began selling produce to another farm business that had experienced COVID-19 related production delays:

> … It's a nonprofit farm where they [are] supposed to have veterans come … so some things didn't get planted … so they're buying produce from us so they can support their own CSA. Hopefully to stay afloat long enough … [ID-04]

Three farmers reported produce sales to institutions and organizations. Of them, two began selling to nonprofit community organizations addressing food insecurity in Maryland. The third farmer, who had previously sold fruit to a school district in Maryland, was able to continue selling to schools and also to expand sales to organizations focused on food security:

> We found that all the organizations that were feeding kids were also looking for fruit. Because what happened is a lot of wholesale companies had dried up. … And so people were pointing them toward us. … And now, you know, I realize that there is an entire production of people that are just trying to feed kids. And so, you know, it's something that I think that we have to look at for the future. [ID-02]

Most farmers were able to sell product through established direct marketing channels, but the pandemic also incentivized expansion of donations and sale of produce to new types of customers.

2. Adaptive Capacity

In addition to modifications in direct marketing channels, farmers also reported numerous adaptive practices employed across channels. All farmers reported making at least one change in *how* they marketed and distributed their produce. We identified seven practices, which we have grouped by most commonly adopted (two practices) and least commonly adopted (five practices). Adaptations were made feasible by existing assets, social safety nets, and personal or institutional knowledge. Notably, farmers only discussed practices that were successful in helping their businesses address new challenges posed by the COVID-19 pandemic. In other words, no farmer reported any practice that was implemented but then abandoned because it was thought to be ineffective.

2.1 Most Commonly Adopted Practices

The two most commonly adopted practices reported were the implementation of prepacking products and a pre-order system. Notably, the two practices went hand in hand, as pre-orders drove the need for prepacked products. Prior to the pandemic, only two farms had established pre-order systems. In response to the pandemic, an additional six farms established pre-order systems. Farmers developed workflows to incorporate online stores, email, and phone or text messaging to manage customer orders. The emergence of these two practices among most farmers is significant, as most did not have any prior experience (e.g., online sales) or established resources (e.g., packaging materials) to draw upon in preparation. Table 2 presents a description of the practice, motivation(s), and advantages and disadvantages as reported by the farmers who used these practices.

The primary advantages of prepacking and pre-orders were decreased risk associated with revenue generation and food waste, and the ability to maintain social distancing between the farmer and customer:

> You're not going to a farmers market hoping it doesn't rain and then coming home with 20 bushels of mesclun mix. [With] preorder, I know it's all sold. So it's decreased risk. It's increased [pauses] it's increased gross revenue. It's decreased that element of risk [waste]. [ID-19]

> And they [customers] would essentially walk up at the table. The table would be further out, so there'd be distance from us. They'd give me their name, you know, we'd go pull out their order and set it on the table. [ID-20]

Conversely, the primary disadvantage of these two practices was the increased administrative time, costs, and workload:

> Having [to] just overnight, to become like an Amazon, and figure out logistics. You know, how you're going to package all this stuff. … I mean, we've figured it all out, and it's fine. It was just stressful at first. [ID-20]

Table 2. Marketing Practices Newly Developed in Response to the COVID-19 Pandemic

Practice	Motivation	Advantages	Disadvantages
Prepackaged products: Harvested items are placed into bags or containers according to the predetermined quantity.	**Health and Safety**: Minimizes the number of people handling customers' food.	• Facilitates social distancing • Perceived customer appreciation • Efficient sales transactions • Increased revenue • Improved inventory skills	• Time-consuming • Reduced consumer engagement and education • Product takes up more space • Packaging costs • Trial and error process • Environmental concerns due to increased plastic use • Must harvest produce sooner
Pre-orders: Customers can place orders prior to pick-up.	**Health and Safety:** Responses to logistical concerns imposed by social distancing **Policy**: Requirement by select farmers markets	• Facilitates social distancing • Increased sales volume • Increased financial certainty for farmers • Assurance that product will not run out • Increased autonomy • Customer preference for online shopping • Reduced food waste • More efficient sales transactions • Meets increased demand	• Increased administrative time • Credit card fees • Website costs • Not accessible for all customers (requires computer literacy) • Learning curve to match inventory with demand • Increased workload • Reduced social interaction and community-building

> We discovered what it's like to pack up a [CSA] share. … We now know how that is, and what it takes. And that the job of packing up a share, having the customers do that is valuable to us. [ID-11]

Broadly speaking, most farmers used a combination of both practices to balance the disadvantages of one with the advantages of another, helping them to move product efficiently and remain financially viable.

2.2 Least Commonly Adopted Practices

We identified five practices employed by fewer farmers in the study. In order from most to least common, they were on-farm pickup, increased online marketing, delivery service, cooperative sales model, and increased prices (Table 3). While presented separately, these less commonly adopted practices often occurred in tandem with prepacked pre-orders. Although less common, these practices are worth noting because they were particularly novel in the context of the pandemic response.

Table 3. Marketing Practices Using Existing Assets

Practice	Motivation	Advantages	Disadvantages
On-farm pickup: Increased public access to the farm, either for the first time ever or to a greater degree (e.g. more days, longer hours).	**Health and Safety:** Caters to customers who are not comfortable with other DTC markets. **Logistics**: Sale of product that is not dependent on external market venues.	• Facilitates social distancing • Increased sales volume • Facilitates social interaction and community building • Reduced food waste • Capitalizes on customers' flexible schedules • No transportation time	• Increased administrative time
Increased online marketing: Use of websites, emails, newsletters, and/or social media accounts to communicate with customers.	**Logistics:** Provide updates on production practices, where to find us, and general COVID-19–related announcements	• Markets to existing customer base • Gains trust through transparency with customers • Platform to address social issues	• Time consuming • Unclear impact/ effectiveness • Requires technological skill (particularly for social media platforms) • Not appropriate for all customer demographics (e.g., elderly)
Delivery service: Farmers delivered product direct to the customer's door.	**Health and Safety:** The ultimate form of customer social distancing. **Financial:** Farms could easily pivot from restaurant to home deliveries	• Increased accessibility for all consumers • Ability to serve more households • Increased autonomy • Competes for market share with big-box grocery store delivery	• Time consuming • Requires existing transport vehicles • Requires existing staff to drive
Cooperative sales model: Farmers selling product made by someone in their social network through their existing direct marketing channel(s).	**Social networks:** Provide financial assistance to other local producers who lost their own direct marketing channels due to COVID-19	• Support Maryland farmers/ producers • Increased social capital • Maintain diversity of local businesses • Increased product variety for customers • Acquire new customers	• Increased administrative time
Increased price: Any increase in the 2019 price per unit due to changes to direct marketing practices.	**Financial**: Price increase reflects increased business costs and high level of uncertainty in future revenue	• Increased revenue per unit sold • Compensation for prepacking time and materials • Reflects increased demand in the market	• Potential loss of existing customers • Ethical considerations about increasing the cost of food during a pandemic

Particular attention should be paid to the disadvantages of adopting these novel practices, which may provide insight into why a practice that was reportedly successful for some farmers was not adopted by most farmers. Another significant observation is that the following set of practices drew upon existing resources (e.g., transportation vehicles), established business practices (e.g., price adjustment), and/or existing social networks.

Ten farmers reported adding an on-farm pick-up option. The practice of opening one's farm was most often reported by farmers who already offered an on-site CSA pickup and by those who wanted a way for additional local community members to purchase their food. Except for one farm that set up coolers to create a market stand, all on-farm pickups were facilitated through a pre-order system:

> I added a pickup location at my house on the island. And so I've had a lot of people, not just locals, but people that don't want to go to the market, pick up here. [ID-01]

Six farmers increased their online marketing or social media presence due to the pandemic. For two farmers, this was a deliberate response to the lack of in-person marketing opportunities in public spaces due to the stay-at-home order:

> We handed out fliers, and then we couldn't hand them out anymore, because of the stay-at-home order. Which actually was kind of an issue, because we would have liked more customers from just within just like five square miles. [ID-09]

However, most farmers chose not to increase online marketing efforts because they already had sufficient customer demand and could not increase production capacity any further.

Five farmers reported offering home delivery. Barriers to adopting this practice included lack of an established pre-order system, lack of existing staff, and/or lack of sufficiently large transportation vehicles. However, for the farmers who did have the resources and infrastructure in place prior to the pandemic, the shift from other direct markets to home delivery was swift:

> I mean, we had a lot of systems in place to enable us to turn. You know, just to do a 180 and do home delivery. So it wasn't terribly hard for us, but we had all that in place. [ID-18]

Four farmers reported selling certain products of another farmer (e.g., flowers) or food producer (e.g., pasta) to customers in their established markets. Cooperative sales appeared to be driven by the goal of maintaining local business diversity during the pandemic:

> And so there was a time where folks [other farmers] were bringing some of their pre-orders to us, and we were going to market, and they were making the coordination with their customer. … And it was simple. It was something that really cost us nothing. But it brought them some business that they really needed because they weren't going to market. So there was a bit of that going on. [ID-02]

The decision to increase prices across direct marketing channels was perhaps the most controversial adaptive practice. Only three farmers reported increasing prices to account for increased costs associated with changing direct marketing channels and distribution practices. No farmer lowered their prices, and the majority kept prices consistent with 2019 prepandemic prices. Some said that it didn't occur to them to raise prices, while others simply didn't think that a price increase was appropriate during the pandemic:

> We figure that it's a cost of doing business. I don't feel good about raising the price—it would never have gone down, it would have only gone up—because we were delivering, and we could have made a list of reasons why it was going to go up. But we just decided to keep it where it was and move forward. … I think people really were trying to find somebody that they could turn to and trust them. And of course, I want to be that somebody. [ID-02]

1.3 Reported Ease of Adaption

Although significant changes were made in terms of *how* farms sold DTC during the COVID-19 pandemic, most farmers reported that adaption was not difficult. This was largely attributed to being a business that was both providing essential services and experiencing a boom in demand.

> I did not anticipate a boom like this. That much interest in people not [emphasis] going into supermarkets. And quite honestly, it's been great. [ID-19]

> We were stunned. And every farmer (this is the dirty secret) every farmer sold more during the COVID-19 shutdown. [ID-02]

Many considered their small size and direct marketing channels to be key factors in their success. A few farmers even mentioned feeling vindicated by the ability of their small to medium-sized farms to respond swiftly to community needs during the pandemic:

> We are adaptable. And we are quick. … And the small sustainable farm is so important to food security. … There's a place for the big guys, but there's sure as hell place at the table for the little guys. [ID-18]

Several also said that farming was not just a job but a passion and calling. This served as a motivating factor for both themselves and their staff:

> This is pretty noble work to begin with—producing food for your local community. … And I'm a second career farmer, and so, I didn't do this to make money. I did it because it [farming] was a calling to me. [ID-16]

It is possible that this outlook played a vital role in the response, because while the farmers reported being overworked and exhausted, they were generally proud of their ability to respond to community needs and be resilient under extreme conditions.

Discussion

Local food systems augment national and global food markets to create a more resilient food system (Millar et al., 2013). In the area of direct marketing, a major driver of resilience at the local food system level, we noted that farmers were under dual pressures. First, from the perspective of sociological systems, new public health guidance for social distancing changed previously viable direct marketing channels. Governing bodies, both at the state level and local farmers market level, worked to rapidly provide vendors with guidance about how to interact with customers. Farmers were also motivated to develop their own contactless ordering and pick-up methods out of respect for their customers' health and safety and for that of their own employees. Second, in terms of agricultural systems, farmers were faced with a perishable product that must be harvested on a predetermined timetable, intensifying uncertainty about where and how they would be permitted to sell their product. Under these conditions, resilient farmers were able to address the one side of the system they did have some control over: direct marketing channels.

The results of this study yield important insights into response diversity and adaptive capacity displayed by local farms in Maryland engaged in DTC and intermediated marketing channels. Every farmer in our study responded slightly differently, but the adaptation and resilience displayed by all is a key reason why farmers didn't simply go out of business. These changes were supported by a reported increased community demand for locally produced food. Not only did these businesses survive, but most actually reported higher revenues than they had projected before the pandemic hit. Farmers who sold to restaurants were most impacted, but resilient farmers managed to successfully pivot into new marketing channels and/or employ new practices. Established CSAs were reported to be an optimal method for reallocating produce originally intended to be sold to reduced/terminated marketing channels. Farmers in our study reported an influx of new customers interested in purchasing a CSA share as other fresh and premade food options became less available. In addition, although pre-ordering systems existed previously, this technique became a significantly more prominent mode of marketing among local food producers during the pandemic. Combined with the universal practice of prepacked produce,

most farms represented in this study successfully changed their distribution practices in response to the pandemic.

The timing of the pandemic was also highlighted as a key determinant of farmers' success. In the early phases of the pandemic, farmers in Maryland were focused primarily on the production of food, and a minority of farms in this sample were actively harvesting and selling produce. Furthermore, the state classification of farmers as essential workers allowed farms to continue business operations relatively uninterrupted. According to our interviewees, had the pandemic impacted daily life in Maryland a few months earlier or a few months later, it is likely that production and/or sales would have been adversely affected. The Maryland stay-at-home order was also significant in that it permitted the movement of customers, because grocery shopping was deemed an essential activity for health and safety (Maryland Executive Order, 2020, p. 3). In fact, elevated customer demand signaled that even though big-box grocery stores were still open and available to the general public, shopping direct from the farmer in an outdoor setting was reportedly a preferred shopping experience for many customers in Maryland and elsewhere (Barnard, 2020; Dance, 2020). This may be because buying direct from the farm offers more air circulation as compared to indoor stores, provides the customer with a pleasurable experience, and is an opportunity to support local businesses.

We have presented a variety of perspectives and responses among farms selling produce direct-to-consumers in Maryland. We cannot be certain, however, how generalizable findings from our study will be to farmers in other geographic regions. In addition, farms that were involved in our study tended to be smaller because larger businesses were less responsive to our recruitment efforts. Furthermore, farms that agreed to participate may have been among those who already successfully navigated adversity within the first months of the pandemic and were, therefore, more willing to speak with researchers.

This research fills a critical gap in understanding Maryland farmers' resilience capacity and ability to adapt to shocks in the food system. While previous literature has focused on measuring the amount of resiliency within the food system (Cutter, 2016; FAO, 2016), our research aimed to observe and catalog effective practices used by individual farm operations and communicate them to the research community. The disruption caused by the COVID-19 pandemic presented an opportunity to explore and capture how Maryland farmers have adapted thus far. Moreover, the observed capacity of farmers to continue feeding their community speaks to the importance of small to medium-sized farmers in the food localization movement, as we look forward and prepare to address future pandemics and other types of potential disruptions, such as natural disasters.

Further research is needed on farmers engaged in direct marketing upon resolution of the COVID-19 pandemic to determine which adaptive practices farmers choose to maintain, discontinue, or perhaps further innovate upon, and why. In the short term, there is value in studying how farmers will choose to manage their production capacity and/or how the use of online storefronts may change as local institutions and restaurants reopen at full capacity. In the long term, it is worth examining how farmers' sales to any one direct marketing channel change in response to a temporary shock, and how the adaptations may become permanent. Dissemination of such research could inform farmers more broadly on how to improve production efficiencies, increase profit margins, and diversify marketing channels, thus allowing them to remain operational and continue playing a role in local systems, which may help with weathering future disruptions. It should be noted that our research did not try to evaluate the effectiveness of methods used by farmers. Rather, our findings could help inform future quantitative studies to measure the effectiveness of responses and reported modifications. We assert that there is substantial value in future research focused on small to medium-sized farms that sell food DTC, as they are a critical component of food system resilience.

Conclusion

Our study explored how fruit and vegetable farmers in Maryland responded to the COVID-19 pandemic. Results suggest that DTC marketing

practices—CSA, farmers markets, and pick-your-own—continued to be effective marketing channels well-suited to withstand the disruption caused by the pandemic. A variety of farmers' responses and adaptive practices were identified. Participating farmers demonstrated resilience as they reorganized and adapted key marketing and food distribution practices in response to health and safety, logistical, and financial concerns.

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