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Giancola, Mikal M and Pinske, Eve C.

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Design by Doing in Louisiana Farmers Markets:

Adaptive Cycles, Learning and Innovating in the Time of the COVID-19 Crisis

Mikal M Giancola, MPH, Eve C. Pinsker, PhD

In March 2020, the Louisiana Healthy Communities Coalition (LHCC) funded two farmers markets to adapt after COVID-19 halted in-person operations. Consumption of healthy foods at farmers markets, especially among poor and minority communities, is a subsidized public health priority in the US (USDA, 2021). Funding supported marketing, adopting online platforms, and farmer incentives. An initial study examining the changes in these farmers markets during COVID-19 investigates if innovation occurred, the factors that influence innovation, the types of learning that facilitated innovating, how COVID-19 influenced learning and innovation. More broadly, the paper discusses how public health institutions can support innovation as co-creators. Qualitative methods were used to analyse documents and transcripts (Miles, Huberman, & Saldaña, 2020). A modified Holling's cycle served as an analytic model to understand how innovation after a crisis unfolds over time (Fath, Dean, & Katzmaier, 2015). Analysis showed during COVID-19, LHCC support resulted in multiple innovations supporting short-term resilience. The discussion demonstrates learning over time addresses the tension between design of interventions as an initial, strategic planning process vs. iterative cycles of co-creating, learning and co-evolving.

Keywords: PSE change, farmers markets, innovation, learning

Introduction

This case study of Louisiana farmers markets discusses underlying issues related to innovation and systemic design: to what extent can social innovation be intentionally “designed” in a guided, stepwise fashion? “Co-creation” is often invoked as a model for participatory design processes, but what does this mean about how participants and facilitators need to learn from each other, in a complex adaptive process of learning and co-evolution? As public health practitioners acting as facilitators worked with farmers market managers and other partners on this project and reflected together through multiple cycles of discussion and action, from planning and initial design to implementation and evaluation, and adaptation and innovation, initial efforts resulted in consequences both planned and unplanned. What does this tell us about how we can facilitate the kind of co-learning that leads to successful innovative responses to complex challenges? This work is embedded in multiple tensions: between individualism and public good, between innovation and regulation, and between top-down approaches to planning and design in contrast to an emphasis on continued cycles of improvisation and learning.

Public Health and Systemic Design

Public health as a field has charged itself with the daunting task of maintaining and improving the public, communal, and societal conditions that support health in individuals and communities, whether that means taking necessary steps to halt the spread of infectious pathogens, assuring access to clinical preventive measures such as vaccines, decreasing environmental toxins, or assuring that all members of the human population have access to what is required to maintain health, including safe conditions for physical activity as well as healthy food. Within the field of United States (US) public health, there is an increasing need to address the broad contexts of the requirements and resources for health. The systemic nature of structural and social interconnections has prompted discussions of the “social determinants of health” – housing, jobs and income, education, the built environment, sustainable food systems, racial and ethnic discrimination vs. equity, etc.

(Liburd et al., 2020). Following that logic, public health must involve itself in community and societal levels of intervention and social innovation. Since 2006, there have been increasing calls for the role of systems science and systems thinking in designing and evaluating such interventions, from complex system modelling and network analysis used as research methods, to systems thinking approaches in community participatory action research and leadership training for public health practitioners (Leischow & Milstein, 2006; Rowitz, 2005; Welter et al., 2021). At the systems thinking and practice end of this spectrum, the inclusion of designing social interventions in the current public health agenda intersects with the emerging field of systemic design (Nogueira & Schmidt, 2021).

Policy, Systems, and Environmental Change(s)

The recognition in US public health of multiple levels of socioecological context, (referred to as “the socioecological model” (SEM)) as well the role of the social determinants of health (SDOH), has led to current efforts to develop systemic approaches to planning intervention. In the last two decades, policy, systems and environmental change (PSE) strategies have been increasingly promoted by the US Centers for Disease Control and Prevention (CDC) and adopted as part of designing and planning US local and state public health interventions (Asada, Lieberman, Neubauer, Hanneke, & Fagen, 2018). Designing, adopting, and adapting PSE interventions often faces the tension of deciding when a problem can be addressed by a change in processes that can be controlled within an organization or in agreements between organizations as opposed to requiring new or amended legislation, whether at the level of local ordinances or at state or federal levels. Innovations often come up against existing regulations that need to be amended – for instance in some US jurisdictions legislation on the use of SNAP cards providing food assistance (discussed below), needed to be amended to permit their use at farmers markets, when earlier regulations only permitted their use at grocery stores. Digging deeper, however, the tension is not just between institutional vs. legislative approaches to change, but between bottom-up, community-based experimentation and learning as the source of innovation vs. top-down policy debates informed by expertise that may come from evidence divorced from community context and not reflect the perspectives of those most affected by the policies.

Andre Nogueira and his colleagues’ work on food waste in Chicago shows a route to mediating the tension between top-down and bottom-up approaches to policy change:

“The shift from a linear progression of steps to a discursive set of modes with a clear structure of content to navigate between them presents a reframe to conventional practices of policy design. Rather than considering policy design a project, with a clear beginning and end, this approach suggests that changes in contexts will result from a continually evolving, socially informed set of interventions that are adaptive, public, and relational in their dynamics. . .” (Nogueira & Schmidt 2021, p. 13)

Nogueira and his colleagues used “participatory prototyping,” with the involvement of multiple stakeholders over several years, to develop and implement new approaches to food waste in Chicago. The cases of farmers’ market innovation in this case study, in contrast, did not have the benefit of the time, resources and design expertise that went into Nogueira et al.’s work, which included a planning process leading up to a 2 and a 1/2-day conference involving 130 participants and 35+ organizations, and follow up communication supporting prototypical experiments in the food system (Nogueira & Schmidt, pp. 9-13). The Louisiana farmers market leaders did not have the luxury of learning about design models, and they were struggling to get food to people who needed it in the rapidly changing and challenging context of the pandemic. Both cases however show the importance of “learning by doing” (ibid, p. 15) as opposed to coming up with design solutions at one go. This however emphasizes the importance of learning, highlighted here through discussion of the evolution of the Louisiana farmers market innovations, catalyzed by the COVID-19 crisis.

The Context for Intervention

For better or worse, crises generate optimal conditions for systemic change because the assumptions and functions of the prior system are neither applicable nor viable (Watzlawick, Weakland, & Fisch, 2011). COVID-19 forced many systems to innovate or perish, especially those related to food systems because they were among the most affected by new norms governing interactions. COVID-19 is stark reminder of the close interconnectedness or human beings with ecological systems, especially the food system that is essential to health and life itself (Attenborough, 2020).

Protecting local and regional farmers markets from collapse is important on many levels. Most relevant to this case, farmers and farmers markets were responsive to local needs for fresh foods when the global food supply-chain was disrupted, and grocery store shelves went empty. Local farmers enhance ecological resilience by producing diverse varieties of fruits and vegetables, in contrast to monocropping (Costello et al, 2009). Other benefits of local food producers, when compared to industrial agriculture, include a reduced carbon footprint from a shorter transportation chain, and reduced refrigeration times for produce (Olson, 2019). Local food also is handled by fewer processors than industrial sources, reducing opportunities for contamination (Marusak et al., 2021). Contemporary public perceptions of farmers market customers are associated with people with wealth and privilege, and many low-income individuals do not use farmers markets because they perceive prices to be too high (Freedman et al, 2016). However, subsidized farmers markets (i.e., support through the Supplemental Nutrition Assistance Program (SNAP)) are used as an evidence-based, public health strategy to address insufficient consumption of fresh fruit and vegetables in the US (Kahin, Wright, Pejavara, & Kim, 2017; US Department of Agriculture (USDA), 2021).

In March of 2020, when the COVID-19 stay-at-home order ended in-person gathering, a ripple effect ensued. The interconnected local and cultural, tourist economy in Louisiana, halted. Farmers markets ceased operations, and they had no outlet for their products. Many began feeding their crops to their livestock. In response to the crisis, the Louisiana Healthy Communities Coalition (LHCC), the state's health coalition, issued requests for proposals (\$3,000 or less) to support food systems to implement PSE change. Among the awardees were two farmers markets that used technology to innovate operations with contactless inventory, payment, and delivery. The markets also promoted themselves on social media. This paper addresses the following questions using the documents available from the mini-grant funded projects as evidence:

1. Did the farmer's market initiatives promote innovation in the food system?
2. What types of learning facilitated innovation? What other factors were facilitating innovation?
3. How did the situation with COVID-19 affect the ability of stakeholders involved with the farmers markets to learn and innovate over time?

Methods

Qualitative methods were used to conduct a systematic document review of program records (Grant application, grant report, evaluation survey, and presentation). Documents and audio transcriptions were stored in MaxQDA®, a software for computer assisted qualitative data. Documents were organized by the dates in which they were submitted, and after an initial reading, reflective memos were written.

After organizing and reviewing the documents, several qualitative analysis data display tools were used to trace and visualize the evolution of learning that resulted in sustainable innovation for these farmers markets. A time-ordered matrix reflecting how the project work unfolded over time was created with Microsoft Excel®. See Miles, Huberman, & Saldaña (2020) on time ordered matrices as a qualitative analysis tool; see the appendix for the matrix. In the matrix, the document type and date are listed at the top of columns horizontally. Vertically on the left, the constructs innovation and new growth were listed from the modified Holling's cycle. The Holling's cycle is a model based on research from ecological systems responding to human, climatological, and other influences (Gunderson & Holling, 2002). It was modified by Fath, Dean & Katmair (2015) to highlight applications to the resilience of organizations and social systems. The Holling's cycle constructs reflect stages in un-learning and learning in collective responses to crisis (cf. Kurt Lewin's model of organizational learning as including "unfreezing" and "re-freezing"). Additional learning-related constructs were included in the matrix, as necessary behaviour for advancing to the next step in the modified Holling's cycle. To complete the time-ordered matrix, pertinent passages from the documents were pasted into the cells related to the corresponding constructs.

Next, the time-ordered matrices were transformed into event-state network diagrams (Miles, Huberman, & Saldaña, 2020). Event-state network diagrams visually communicate events and the processes that contributed to them over time. Then, documents were coded with MaxQDA® to support thematic analysis, using a hybrid approach to coding (Fereday and Muir-Cochrane 2006). A codebook was created using a priori codes derived from the study's conceptual framework and emergent codes based on induction from the data. After coding the documents, time-sequence inconsistencies were observed between the initial event-state network diagrams and

the actual sequence of events; those were revised. Finally, an iceberg analysis was applied to the data as an analytic framework to reveal underlying values and mindsets (Hall, 1976; Meadows, 2010).

This qualitative analysis is part of ongoing work: the intention is to use this analysis as part of ongoing action research cycles where preliminary findings are fed back to stakeholders to prompt discussion about recommendations for further action. The results displayed are from the two farmers markets. Only one market's data is presented here because the findings were similar for both, but the more robust data was from the Crescent City Farmers Market. The differences could be an area for further investigation but are not the topic of this paper.

Results

The time-ordered matrix was transformed to a table for easier comprehension (See the appendix for the original).

Table 1. Summary of the time-ordered Matrix.

Points in time are shown vertically, down the page. The document type and the date it was created are in the left column. Learning related constructs used in the analysis are in the middle column. Condensed summaries of data and/or illustrative quotes are in the right column.

Document Type (Date)	Construct	Condensed Data and/or "Quotation"
Grant Application (April 2020)	Innovation	Market partners developed and tested aggregating farmers' products for home delivery (FA&D). LHCC funds software, marketing SNAP/MarketMatch, branding, and farmer incentives.
Grant Report (June 2020)	Innovation	Market workers used personal protective equipment and practiced safe food handling. Marketing for SNAP/MarketMatch, via Facebook and Google ads, and branding.
Grant Report (June 2020)	Social Learning	The market communicated with other markets via coalitions sharing resources and lessons learned.
Evaluation (August 2020)	Innovation	Partnership and resource sharing was vital (shared refrigeration, delivery, etc.). The grant gave the market the ability to experiment and build out other service lines such as the drive-through model. Targeted advertising brought in customers
Evaluation (August 2020)	New Growth	Partners came together to develop and test aggregating farmers' products and distribute them to customers via safe, home delivery.
Evaluation (August 2020)	Deutero Learning	"The ingenuity of our individual staff members who were able to change roles was critical."
Evaluation (August 2020)	Other Learning	Farmers learned to do wholesale. The Market staff were trained in food handling and COVID safety.
Presentation (January 2021)	Innovation	"Contactless" distribution was important. The farmer incentive encouraged flexibility. The drive-through model became more popular than home delivery; in-person market re-emerged, and people order online first.
Presentation (January 2021)	New Growth	The Market implemented curb side pickup, in-person modified, and home delivery. The Market has a larger newsletter distribution, it communicates to customers via Constant Contact, and that facilitates customer management. "Support local" messaging was meaningful.
Presentation (January 2021)	Deutero Learning	"We continue to evolve and adapt. So, we've got kind of three or four different operation models now."

Table 1 focuses on answering the research questions 1 & 2; did innovation occur and if so, what types of learning were present during innovation? At the earliest date in April of 2020, the farmers markets proposed to use grant funding to support a technological innovation they decided to adopt given their new circumstances. They used funding to create demand through marketing and maintain supply with incentives for farmers; farmers needed a nudge to adapt. By June 2020 markets reported that they had adopted technology, and the additional grant funding gave the market the flexibility to try multiple distribution modalities at the same time. While it had social media channels already, this was the market's first experience with paid boosting- a further adoption of an innovation to create product demand. Market workers also had additional training in food safety- learning other

knowledge and skills for adapting. Ongoing conference calls were a vital contributor to new partnerships and the recombination of resources. By August 2020, evaluation results showed new organizational arrangements, new partnerships, and high levels of collaboration. Market staff demonstrated the ability to change roles as needed, to learn by doing, and learn from doing. Practicing and publicly communicating COVID-19 safety around food was ongoing. Finally, when the grantees presented in December 2020 and January 2021, they demonstrated an adaptive mindset and were using multiple operational models -- “we continue to evolve and adapt, we’ve got kind of three or four different models now,” and had further adopted technology, Constant Contact, for customer resource management (CRM) and insights. Although it does not appear in the table, the market applied for and received additional grant funding to grow its MarketMatch program for low-income customers.

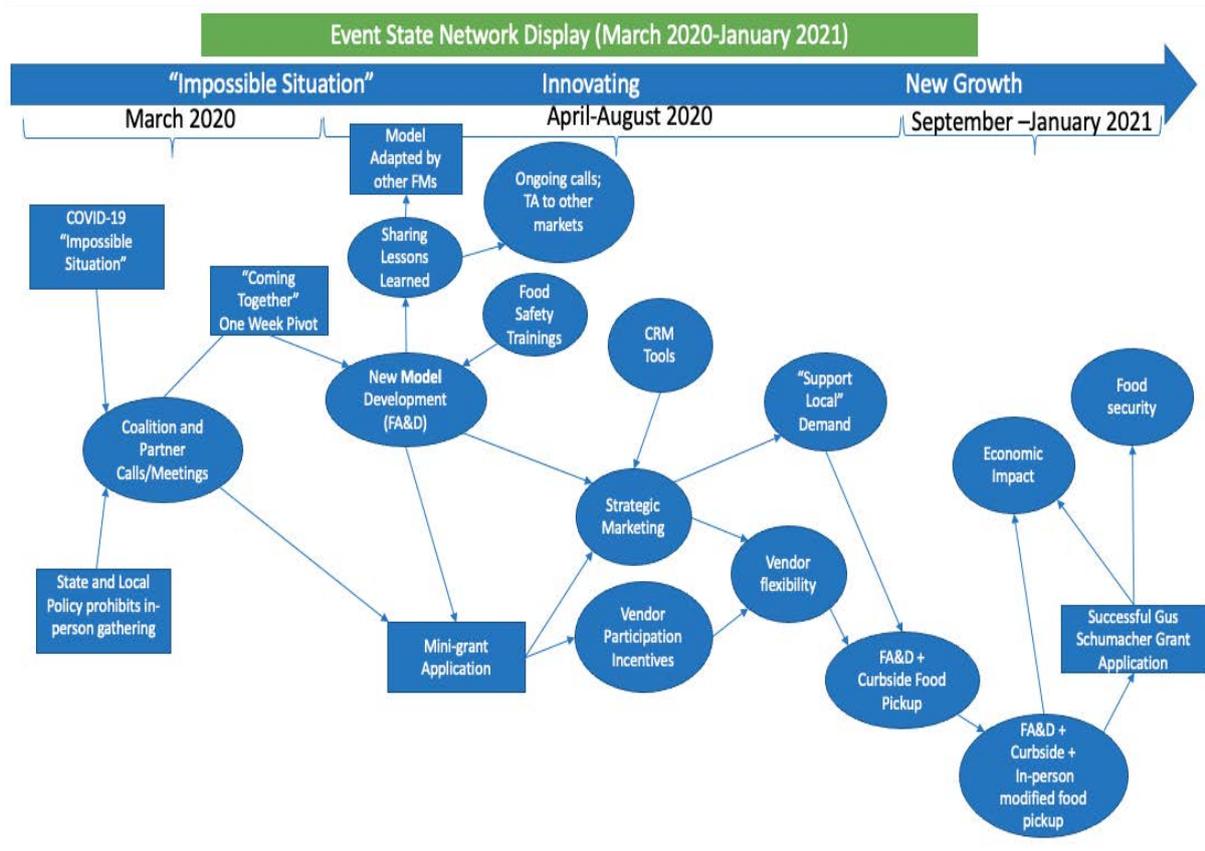


Figure2.: Event-State Network Diagram for the Crescent City Farmers Market

The matrix was translated into an event-state network display, shown in Figure 1. This shows events in rectangles as key moments in time. Processes that contributed to the events are represented as circles. The arrows represent the contribution of the process and events to each other during the timeline at the top of Figure 1.

Figure 1 shows the evolution of events from crisis, or in the words of a grantee “an impossible situation,” through key episodes of innovating and new growth, reflecting the modified Holling’s cycle. It demonstrates the impact of systems governance, or legislative policy, where the authority of the state halted the system. First, markets leaders hosted calls to discuss the “impossible situation,” where new models were shared, developed, and implemented on an ongoing basis. The LHCC mini-grants and other resources were critical to the development, failure, and growth of innovative models. To remain viable, the market transformed its role from hosting in-person markets to a food aggregation and delivery (FA&D) hub. As scientific knowledge of harm reduction from COVID-19 evolved, so did the market models. The models started with FA&D only and went to simultaneous FA&D, curb side pick-up, drive-through, and modified in-person markets. Paid social media drove demand and the market worked closely with vendors who ultimately were selling out of their products. The market applied for grants successfully to institutionalize the new modalities. This had a local economic impact by keeping funding local, it reduced food insecurity, and facilitated consumption of fresh fruits, vegetables, and fish.

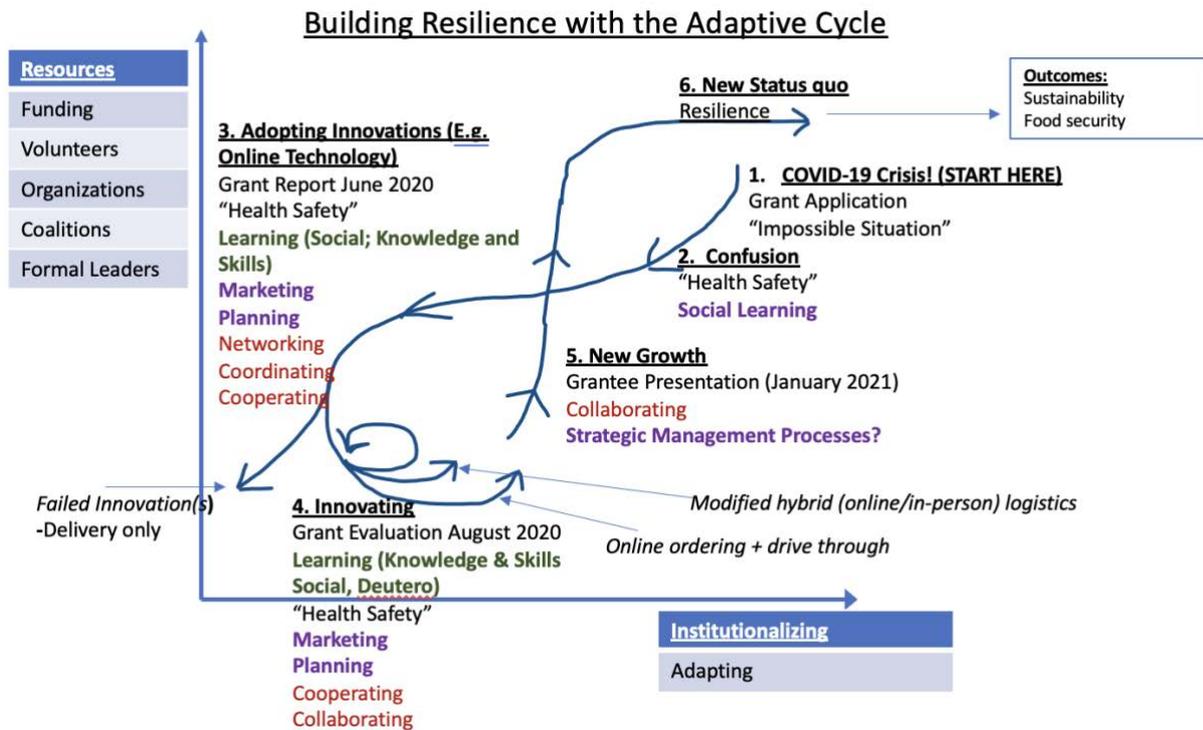


Figure 2: Visualization of Learning Using the Modified Holling's Cycle

Figure 2 shows the events and processes reflected in the event-state diagram summarized by stages of the modified Holling's cycle and the key co-learning and co-creation processes that underpinned them.

The Modified Holling's Cycle:

1. In March 2020, because of COVID-19 crisis, in-person gathering at farmers markets was halted by elected officials, creating an "impossible situation" for markets and farmers. Looking for pathways forward, the markets applied for a grant from the LHCC in April of 2020.
2. After the initial crisis and accepting the prior status quo was no longer viable, the farmers markets had to make sense of the new situation. They did it together by participating in ongoing conference calls (including videoconferencing) with food access coalitions locally, state wide, and nationally. They also engaged in social learning within their own market by working closely to identify possibilities to consider for later experimentation and adoption. "Health Safety" was an emergent, grounded construct and frequent phrase of vital importance.
3. The markets began experimenting and adopting existing innovations. Many markets have training in safe food handling, so market staff adapted easily to adding protocols for personal protective equipment. The contactless technologies for inventory, logistics, and delivery required market staff to learn knowledge and skills to operate them. The farmers and market learned to wholesale with each other. The market staff learned to use paid advertising techniques with social media. Initially, the new FA&D model came together through local networking on calls, then coordinating resources and activities (e.g. freezer space, deliveries, etc.), and ultimately cooperation between organizations merging certain operations to get fresh food to the public. Market managers set short-term goals and objectives for the innovations. Volunteers showed up to help with whatever was needed on an ongoing basis. The initial innovation was food delivery only, and while it is currently an option, it did not grow significantly as a service line.
4. Building on adopted innovations, the market began innovating altogether new models of food distribution including delivery, modified in-person pick-up, drive through, and a modified in-person farmers market. None of these modalities existed as such before COVID-19, never mind simultaneously. Market staff learned to experiment and develop new models together, in some regards the local food system was at stake- these are requisites for deutero learning to occur (Visser, 2007). Market staff further shared that learning with other markets via food coalition meetings and likely learned from

sharing. The broader feeling of the importance of supporting the local community was also evident in the success of using social media marketing with “Support Local” messaging. Photos on social media clearly communicated the health safety precautions the markets were implementing to the public. The market management balanced the demand needs of customers, who were literally at hoarding, with the supply local and regional farms had to offer. Unfortunately market staff reported, with great concern, that initially the people with the most resources were the first in line to buy fresh fruits and vegetables.

5. As SNAP dollars and recipients expanded, the farmers market focused marketing efforts on SNAP eligible demographics and expanding MarketMatch dollars thereby doubling SNAP purchases for low-income people and families. The market successfully applied for a Gus Schumacher grant that expanded MarketMatch by half a million dollars. By January 2021, the presenter (to the coalition) reported increased local customers, increased revenues overall, adopting additional innovations (e.g. Constant Contact) to do more targeted marketing, and extended grant funding. The initial, home delivery model, is now used for customers with limited mobility, the immunocompromised, and those without access to transportation. Operating multiple business models has required a high level of collaboration with other organizations, farmers, businesses, volunteers, and local government (e.g. traffic logistics for curb side pick-up, use of public spaces).
6. The new status quo is characterized by variety. The markets demonstrated resiliency through learning and adaptation.

Discussion

At the onset of COVID-19, farmers markets initially innovated the food system by adopting online technology; an option the market managers had considered in the past aspiring to increase market efficiency. COVID-19 accelerated the adoption of online technologies (logistics, inventory, and payment) because of its low friction and “contactless” capacity for transactions. After a literature review, it appears other markets in the US did the same (Mittal & Grimm, 2020). Literature also supports using social media to inform community members about market operations and programs (e.g. SNAP), however markets typically do not have funding for this- possibly due to restrictions on public funding for SNAP programs (Nuss, Skizim, Afaneh, Miele, & Sothern, 2017; Skizim et al., 2017). The markets engaged in marketing and collaborating with partners to adapt to ever-changing circumstances and resource availability. The markets used social media to display their “Health Safety” practices of mask wearing and food handling to help customers feel safer about buying local food. Markets reported an increased customer base.

Both markets appear to have innovated and built organizational resilience because suppliers (farmers) learned to sell in new ways and customers (buyers) adapted to new purchasing modalities. From an organizational sustainability perspective, the farmers markets adaptively and strategically managed this new relationship between supply and demand. This contributed to short-term resilience and will hopefully contribute to market sustainability. Given the ongoing pandemic and high baseline level of natural disasters in Louisiana, the new status quo may be unrecognizable or a continuation of the present.

Different types of learning were evident at different parts of the cycle. Social Learning and Deutero Learning were theory-based constructs initially utilized in the codebook. Social learning happens when peers are sharing and/or developing ideas together for common understanding, planning, and ultimately actions proposed or happening in the future (Jones, 2008; Wenger, 2010). Social learning appeared at and between the group, market, and coalition levels. The markets engaged in social learning with group support for adoption of initial innovations. The Crescent City Farmers Market also became a source for social learning for other farmers markets in the state that were adopting and adapting many of the same innovations. Learning new knowledge and skills to adopt the innovations was necessary for implementation. Learning these technical skills and training others to use them (e.g. online inventory platform) was part of the innovation process. This knowledge carried forward within people and across to others. Learning knowledge and skills was a theme emerging inductively from the data indicating that individuals learned how to do new things (Welter, Todd Barrett, Davis, Lloyd, & Rose, 2020).

Building on past learning appeared requisite for the appearance of deutero learning. Deutero learning is, most simply stated, “learning how to learn” (Bateson, 2008; Visser, Max, 2003). However, deutero learning is always contextual (in relation to others and/or the environment), and that context typically is interwoven with the values

of the person needing to adapt (Visser, 2007). Deutero learning in this case, led to innovating new models altogether in a rapidly changing context.

Conclusion

What does this case tell us about designing social interventions in public health, and how to respond to the tension between designing an intervention at the outset and the need to respond to new possibilities as events unfold, especially when living through chaotic times? The documented importance in this case of learning, including learning how to learn (deutero-learning) in supporting re-design and innovation, leads us to recommend that would-be leaders of social intervention – whether they are public health practitioners, designers, or funders – need to support continuous cycles of design, implementation, and evaluation. These cycles must allow for some attempts or experiments to fail, in the service of learning and adaptive evolution. Using the Holling cycle as a tool lets us see this and could help facilitate discussions among stakeholders that would be more supportive of new alternatives and promote resilience through chaos. The idea of repeated cycles is similar to the call for “agile” approaches to management that came out of software design. However, as opposed to change efforts within a single organization, a greater variety of “actants” are involved in social interventions, which means greater challenges for including a wide range of actors and perspectives.

Systemic designers ought to draw on the efforts of the past 15 years to apply systems approaches in evaluation by Williams and Iman, and Patton (Patton, 2010; Williams & Iman, 2007). Evaluation practitioners working from a systems perspective have expanded their role to involvement in design and facilitation of design conversations (e.g. developing Theory of Change, cf. Breuer et al. 2016) at the outset of an intervention, as well as support for reflections along the way through data collection and presentation of preliminary analyses to stakeholder groups. The Systemic Design Toolkit could be extended by utilizing some of the tools used by systems-oriented evaluators. Conversely, systems evaluators could benefit from some of the tools in the Systems Design toolkit.

Researchers play the role of someone who recognizes and analyses patterns of meaningful relationships and factors underlying the sometimes chaotic and random-seeming cascade of events. Then they feed back this information on patterns to the stakeholders representing the larger system, supporting collective participation in sense-making and the determination of next steps, in action research cycles (Ivankova 2015). Ethnographers, designers, and evaluators can all potentially play this sort of role (it is a role well-suited to developmental evaluators, cf. Patton 2011). One of the implications for the design of social innovation is that given the complex, nonlinear processes involved in this sort of work, building in multiple opportunities for shared systematic reflection is important. The advantage of information for supporting course correction to respond to constantly changing context as well as the need to recognize opportunities for scaling up and out through, for instance, recognizing and communicating best practices means that this sort of analysis and feedback is more than an academic exercise.

Those interested in methods may question why we utilized documents as data sources as opposed to interviews. Interviews will be part of the larger work; the documents are a small pilot piece. Documents can provide rich sources of data and, at least in public health work, are often under-utilized. In this case, one of the authors, Giancola, was present at some of the activities that generated the documents and hosted the presentations. Furthermore, his knowledge of and involvement with the stakeholders supports the analysis presented here. The close attention to concrete data required by formal qualitative analysis of documents provides support for validity of findings, checking and countering uncritical or unexamined assumptions that the researcher may have initially held. In the current environment, with so many people confronting daily challenges that demand their time, utilizing documents as opposed to trying to schedule interviews has the additional advantage of lesser burden on participants. When utilizing documents as data sources to support ongoing development of an intervention, or evaluation at any point, it is important to further strengthen and validate preliminary analysis through interactive discussions with stakeholders. This is projected to happen in the future development of this project. Such qualitative analysis-based discussions have the potential to extend further learning and strengthen a participatory design process.

Appendix:

Table 3. Time-ordered Matrix for the Crescent City Farmers Market

Dates -->	Apr-20	Jun-20	Aug-20	Jan-21
Document Type	Grant Application	Grant Report	Evaluation	Presentation
<i>Adaptive Cycle</i>	Summary	Summary	Summary	Summary
Innovation	Partners developed and tested aggregating farmers' products for home delivery. LHCC Funded marketing SNAP/MarketMatch, branding, and farmer incentives	Market workers used personal protective equipment and practiced safe food handling Marketing for SNAP/MarketMatch, via Facebook and google ads, and branding.	Partnership and resource sharing was vital (shared refrigeration, delivery) The grant gave the market the ability to experiment and build out other service lines such as the drive-thru model Targeted advertising brought in customers	"Contactless" distribution was important The farmer incentive encouraged flexibility The drive-through model became more popular than home delivery; in-person market re-emerged and people order online
New Growth			Partners came together to develop and test aggregating farmers' products and distribute them to customers via safe, home delivery;	The Market implemented curbside pickup, in-person modified, and home delivery The Market has a larger newsletter distribution, it communicates to customers via ConstantContact, and facilitates customer tracking "Support local" messaging was meaningful
<i>Learning</i>				
Social		The Market communicated with other markets via coalitions sharing resources and lessons learned		
Deutero			"The ingenuity of our individual staff members who were able to change roles was critical"	"We continue to evolve and adapt." So we've got kind of three or four different operation models now. -Presenter
Other			Farmers learned to do wholesale The Market staff were trained in food handling and COVID safety	

Table 1, in the left hand column, focuses on the innovation and new growth constructs from the modified Holling's cycle. At the earliest date in April of 2020, the farmers markets propose to use funding for an innovation they had already decided to adopt. By June 2020 the markets had time to adopt and adapt their innovation and they were sharing they challenges, successes, and "lessons learned" with other markets via ongoing conference calls. Market workers also had additional training in food safety- learning knowledge and skills for change. When the grantees presented in December 2020 and January 2021, they have adopted and adaptive mindset- "we continue to evolve and adapt, we've got kind of three or four different models now."

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References

- Asada, Y., Lieberman, L. D., Neubauer, L. C., Hanneke, R., & Fagen, M. C. (2018). Evaluating structural change approaches to health promotion: An exploratory scoping review of a decade of U.S. progress. *Health Education & Behavior, 45*(2), 153-166. doi:10.1177/1090198117721611
- Attenborough, D. (2020). *A life on our planet my witness statement and a vision for the future* (1st ed.). New York: Grand Central Publishing.
- Bateson, G. (2008). *Steps to an ecology of mind* (6. [print.] ed.). Chicago, Ill. [u.a.]: Univ. of Chicago Press.
- Costello, A., Abbas, M., Allen, A., Ball, S., Bell, S., Bellamy, R., . . . Patterson, C. (2009). Managing the health effects of climate change: Lancet and university college London institute for global health commission. *The Lancet (British Edition), 373*(9676), 1693-1733. doi:10.1016/S0140-6736(09)60935-1
- Fath, B. D., Dean, C. A., & Katzmair, H. (2015). Navigating the adaptive cycle: An approach to managing the resilience of social systems. *Ecology and Society, 20*(2), 24. doi:10.5751/es-07467-200224
- Freedman, D. A., PhD., Vaudrin, Nicole, MS, R.D., L.D., Schneider, C., M.A., Trapl, E., PhD., Ohri-Vachaspati, P., Taggart, M., M.U.P.D.D., . . . Flocke, S., PhD. (2016). Systematic review of factors influencing farmers' market use overall and among low-income populations. *Journal of the Academy of Nutrition and Dietetics; J Acad Nutr Diet, 116*(7), 1136-1155. doi:10.1016/j.jand.2016.02.010
- Gunderson, L. H., & Holling, C. S. (2002). *Panarchy: Understanding transformations in human and natural systems*. Washington, DC (USA): Island Press. Retrieved from <https://agris.fao.org/agris-search/search.do?recordID=XF2015007908>
- Hall, E. T. (1976). *Beyond culture*. New York, NY: Random House.
- Himmelman, A. T. (2001). On coalitions and the transformation of power relations: Collaborative betterment and collaborative empowerment. *American Journal of Community Psychology, 29*(2), 277-284. doi:10.1023/A:1010334831330
- Ivankova, N. V. (2014). *Mixed methods applications in action research: From methods to community action* Sage Publications. Retrieved from <https://www.vlebooks.com/vleweb/product/openreader?id=none&isbn=9781483311326>
- Jones, P. (2008). *We tried to warn you innovations in leadership for the learning organization*. Ann Arbor, MI: Nimble Books, LLC.
- Kahin, S. A., Wright, D. S., Pejavara, A., & Kim, S. A. (2017). State-level farmers market activities: A review of CDC-funded state public health actions that support farmers markets. *Journal of Public Health Management and Practice; J Public Health Manag Pract, 23*(2), 96-103. doi:10.1097/PHH.0000000000000412
- Leischow, S. J., & Milstein, B. (2006). Systems thinking and modelling for public health practice. *Am J Public Health, 96*(3), 403-405. doi:10.2105/AJPH.2005.082842
- Liburd, L. C., Hall, J. E., Mpofu, J. J., Williams, S. M., Bouye, K., & Penman-Aguilar, A. (2020). Addressing health equity in public health practice: Frameworks, promising strategies, and measurement considerations. *Annual Review of Public Health, 41*(1), 417-432. doi:10.1146/annurev-publhealth-040119-094119

- Marusak, A., Sadeghiamirshahidi, N., Krejci, C. C., Mittal, A., Beckwith, S., Cantu, J., . . . Grimm, J. (2021). Resilient regional food supply chains and rethinking the way forward: Key takeaways from the COVID-19 pandemic. *Agricultural Systems*, 190, 103101. doi:10.1016/j.agsy.2021.103101
- Meadows, D. H. (2010). *Thinking in systems* (1. publ., repr. ed.). London [u.a.]: Earthscan.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative data analysis* (Fourth edition ed.). Los Angeles; London ; New Delhi ; Singapore ; Washington DC ; Melbourne: SAGE. Retrieved from http://bvbr.bib-bvb.de:8991/F?func=service&doc_library=BVB01&local_base=BVB01&doc_number=030740484&sequence=00002&line_number=0001&func_code=DB_RECORDS&service_type=MEDIA
- Mittal, A., & Grimm, J. (2020). ICT solutions to support local food supply chains during the COVID-19 pandemic. *Journal of Agriculture, Food Systems, and Community Development*, 10(1) doi:10.5304/jafscd.2020.101.015
- Nogueira, A., & Schmidt, R. (2021). Participatory policy design: Igniting systems change through prototyping. *Policy Design and Practice*, ahead-of-print(ahead-of-print), 1-19. doi:10.1080/25741292.2021.1888399
- Nuss, H., Skizim, M., Afaneh, H., Miele, L., & Sothern, M. (2017). Farmers' market utilization among supplemental nutrition assistance program recipients in New Orleans, Louisiana: Preliminary findings. Atlanta, GA: International Society on Hypertension in Blacks. doi:10.18865/ed.27.S1.295
- Olson, K. A. (2019). *The town that food saved? investigating the promise of a local food economy in Vermont*. Abingdon, Oxfordshire: Carfax International Publishers. doi:10.1080/13549839.2018.1545753
- Patton, M. Q. (2010). *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. Guilford. Retrieved from <http://www.vlebooks.com/vleweb/product/openreader?id=none&isbn=9781609180911&uid=none>
- Radcliffe, J., Skinner, K., Spring, A., Picard, L., Benoit, F., & Dodd, W. (2021). Virtual barriers: Unpacking the sustainability implications of online food spaces and the Yellowknife farmers market's response to COVID-19. London: BioMed Central. doi:10.1186/s12937-021-00664-x
- Rowitz, L. (2005). *Public health for the 21st century: The prepared leader* (1st ed.). Sudbury, MA: Jones & Bartlett Publishers.
- Senge, P. M. (2006). *The fifth discipline: The art and practice of the learning organization* (Rev. and updated. ed.). New York: Doubleday/Currency. Retrieved from <https://i-share.carli.illinois.edu/vf-uc/Record/UICdb.1925813>
- Skizim, M., Sothern, M., Blaha, O., Tseng, T. S., Griffiths, L., Joseph, J., & Nuss, H. (2017). Social marketing for a farmer's market in an underserved community: A needs assessment. *Journal of Public Health Research; J Public Health Res*, 6(3), 815. doi:10.4081/jphr.2017.815
- Swartz, H., Santo, R., & A. Neff, R. (2018). Chapter five - promoting sustainable food system change amidst inequity: A case study of Baltimore, Maryland. *Advances in Food Security and Sustainability*, 3, 135-176. doi: <https://doi.org/10.1016/bs.af2s.2018.09.006>
- USDA. (2021). Farmers market nutrition program. Retrieved on September 13, 2021: from <https://www.fns.usda.gov/fmnp/wic-farmers-market-nutrition-program>
- Visser, M. (2007). Deutero-learning in organizations: A review and a reformulation. *The Academy of Management Review*, 32(2), 659-667. doi:10.5465/AMR.2007.24351883
- Visser, M. (2003). Gregory Bateson on deutero-learning and double bind: A brief conceptual history. *Journal of the History of the Behavioral Sciences*, 39(3), 269-278. doi:10.1002/jhbs.10112

Watzlawick, P., Weakland, J. H., & Fisch, R. (2011). *Change* (Updated paperback ed. 1974 ed.). New York, NY: Norton.

Welter, C., Todd Barrett, K., Davis, S., Lloyd, L., & Rose, B. (2020). *Creating a learning agenda for systems change: A toolkit for building an adaptive public health workforce*.

Welter, C., Jarpe-Ratner, E., Bonney, T., C. Pinsker, E., Fisher, E., Yankelev, A., . . . Zanoni, J. (2021). Development of the healthy work collaborative: Findings from an action research study to inform a policy, systems, and environmental change capacity-building initiative addressing precarious employment. *Health Promotion Practice, 22*(1), 41-51. doi:10.1177/1524839920953116

Wenger, E. Communities of practice and social learning systems: The career of a concept. *Social learning systems and communities of practice* (pp. 179-198). London: Springer London. doi:10.1007/978-1-84996-133-2_11 Retrieved from http://link.springer.com/10.1007/978-1-84996-133-2_11

Williams, B., & Iman, I. (2007). *Systems concepts in evaluation: An expert anthology*. Point Reyes, CA: Edge Press.