

COMMENTARY ON COVID-19 AND THE FOOD SYSTEM

ICT solutions to support local food supply chains during the COVID-19 pandemic

**JAFSCD
Responds to
the COVID-19
Pandemic**



Anuj Mittal^{a *}

Dunwoody College of Technology

Jason Grimm^b

Iowa Valley Resource Conservation & Development

Submitted September 27, 2020 / Published online November 10, 2020

Citation: 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), 237–241. <https://doi.org/10.5304/jafscd.2020.101.015>

Copyright © 2020 by the Authors. Published by the Lyson Center for Civic Agriculture and Food Systems. Open access under CC-BY license.

Abstract

The COVID-19 pandemic has disrupted food supply chains operations across the globe. Due to health safety practices like social distancing, local food supply chains such as farmers markets and food hubs are unable to conduct normal operations. This paper describes two low-cost information and communication technology (ICT) solutions developed for a farmers market and a food hub in Iowa to enable them to continue their operations during the pandemic while ensuring the safety of vulnerable consumers and essential workers. Other benefits of ICT for the long-term sustainability of local food systems are also discussed.

Keywords

Local Food, Farmers Market, COVID-19, Pandemic, Food Hub, Information and Communication Technology, ICT

^{a *} *Corresponding author:* Anuj Mittal, Senior Instructor, Dunwoody College of Technology, 818 Dunwoody Boulevard; Minneapolis, MN 55403 USA; +1-515-708-3430; amittal@dunwoody.edu

^b Jason Grimm, Deputy Director, Iowa Valley Resource Conservation & Development; 920 48th Avenue; Amana, IA 52203 USA: jason@ivrcd.org

Funding Disclosure

USDA Farmers Market Promotion Program grant (Award No. 16-FMPP-IA-0027) and USDA Local Food Promotion Program grant (Award No. AM170100XXXXG156) supported this work. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture.

Acknowledgment

The authors would like to thank Allen Canzonieri for his contribution in the development of the virtual marketplace for Riceville Farmers Market and Julia DeSpain for her help to create the illustrations.

Introduction

The COVID-19 pandemic saw increased grocery store shopping due to consumers' fears of visiting a restaurant or even of food shortages. This panic buying situation resulted in empty grocery shelves at the supermarkets, and so consumers turned toward local food alternatives. However, the operations of market channels for local food such as farmers markets and food hubs were also disrupted due to social distancing measures and crowd size restrictions. Many farmers markets across the U.S. had to scale down or intermittently shut their operations due to a decline in the number of vendors as well as the number of customers visiting (Williams, 2020).

Adoption of information and communication technology (ICT) offers a potential solution to mitigate the disruption in local food supply chains, especially during times of crisis, such as the pandemic. This paper discusses two case studies where low-cost ICT solutions were developed for regional food supply chains in Iowa, which enabled them to continue their operations uninterrupted during the pandemic and improved their overall efficiency as well. We close by discussing future research directions and providing a brief description of the ongoing work to develop new ICT solutions for local food systems.

Case Studies

Virtual Marketplace for Riceville Farmers Market

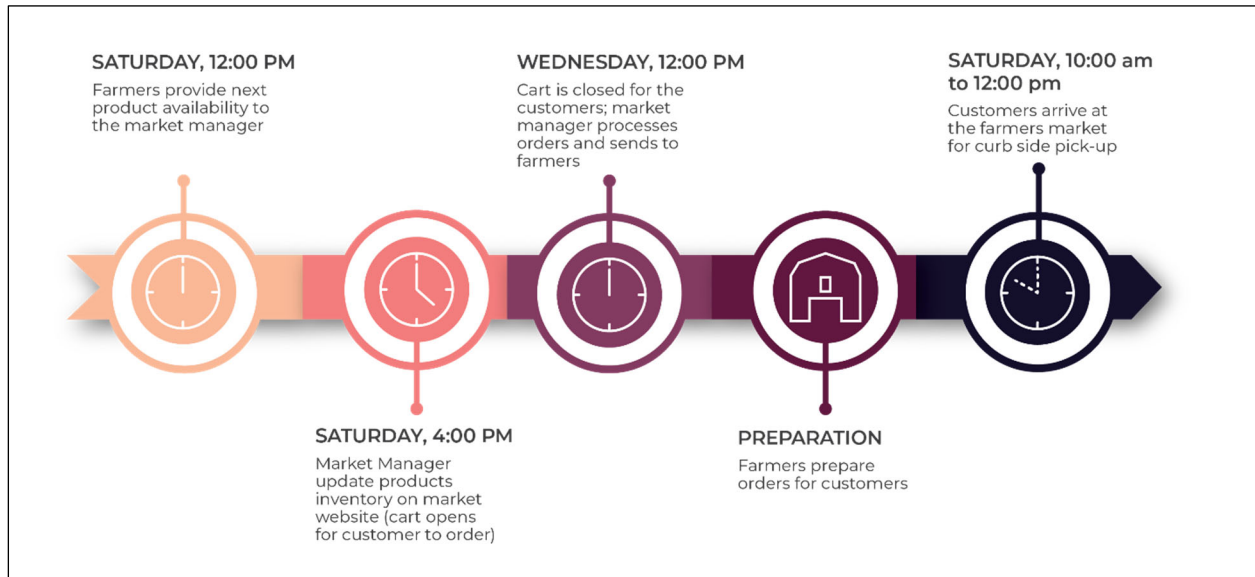
Riceville, a small city in northeastern Iowa with a total population of 827, consists primarily of an elderly population; the median age is 41.6 years (Data USA, 2020). The local farmers market is the primary source of fresh produce and bakery items for the people of Riceville, as there are no stores or supermarkets offering these items in the city. The farmers market in Riceville is operated by a nonprofit organization and is run primarily with the help of unpaid volunteers.

The farmers market starts its operations every year in May. However, with the onset of the pandemic and due to the vulnerable population in the city, it could not conduct normal operations by having customers visit farm stands at a physical location. Therefore, a virtual solution was required such that customers could visit a vendor's shop online and see the products that are available, purchase what they like, and get the products in a contactless manner, thus avoiding any potential exposure.

A virtual marketplace, developed using WordPress, was established to ensure that the continuity of the farmers market was maintained. The virtual market works on a weekly cycle, in which the farmers provide information on product availability to the market manager by Saturday. The online shopping cart opens every Saturday and customers can add products to their carts until the following Wednesday. Upon receiving the customer orders, market managers send the list of products that farmers need to bring to the farmers market on Saturday morning. The customers pick up their orders on Saturday morning via the curbside delivery option in a contactless manner. The customers are asked to bring individual checks and/or exact amounts in cash for each farmer based on their order. The exact amount owed to each farmer is displayed to the customer when they place their online order through the website. The timeline for these activities is shown in Figure 1.

The virtual platform is operated solely by the market manager, as many vendors selling through the farmers market are Amish, who abstain from using the internet. Therefore, additional automated solutions using Microsoft Excel and Visual Basic for Applications were developed for the market manager to quickly upload weekly inventory on the platform and develop order lists for all the vendors after the customers' orders. The platform has been developed with a very low initial and no running cost, as any incremental cost could be a burden on farmers and, thus, customers. While many web-based programs exist to help with this type of aggregation and distribution of products for farmers markets, most of them have monthly or yearly subscription fees, which puts additional financial burden on small

Figure 1. Timeline of the Activities in the Virtual Farmers Market at Riceville, Iowa



farmers. The initial advertisement of the online platform was done through the local newspaper as well as at the location where the physical market used to be held (Figure 2). The virtual platform enabled seamless operations of the farmers market and helped the people of Riceville get access to local and fresh food amid the pandemic.

Contactless Curbside Pickup for Iowa Food Hub

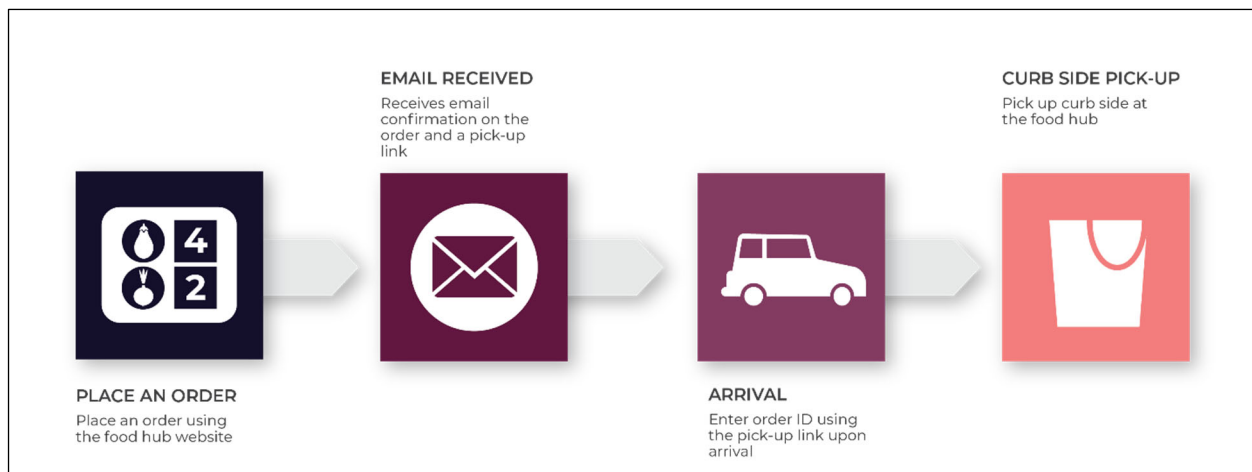
Iowa Food Hub (IFH), located in Decorah, Iowa, is a direct-to-consumer food hub that purchases food from local farmers and sells it to both institutional and retail customers on a weekly basis. Before the pandemic, IFH offered retail customers an option to pick up orders at their aggregation facility, in addition to fee-based home delivery. However, due to the social distancing guidelines imposed during the pandemic, IFH switched to having customers do curbside pick-ups. During the pick-up time window of two hours every Saturday, at least one food hub employee had to be at the curb. Whenever a



customer arrived to pick up their orders, a food hub employee requested the order ID from the customer, came back into the aggregation facility to retrieve the order, and finally went back to hand the order to the customer. This became a time-consuming process and increased confusion, especially when multiple customers arrived at the same time. In addition, it led to greater risk for the food hub employees and customers due to increased exposure during the pandemic.

An ICT solution was developed to facilitate contactless deliveries and enable effective and efficient communication between the food hub employees and customers. The solution allows the customers to indicate their arrival at the curb side by clicking on a unique link they receive in their order confirmation email. Upon clicking the link and entering their car details and order ID number, the food hub employee gets a notification over text and email along with the customer details. This allows the food hub employees to retrieve the customer's order from the warehouse and deliver it in a contactless manner. This whole process is easy for the participants to use, involves little to no cost as it is developed using Google Forms and Google Apps Script, minimizes the physical effort by the food hub employees, and avoids any confusion. The process of curbside delivery using the ICT solution that was developed is shown in Figure 3. A similar solution was developed for Alaska Food Hub, located in Homer, Alaska, and North Iowa Fresh located in Clear Lake, Iowa.

Figure 3. Flowchart of the Contactless Curbside Pick-up Method at Iowa Food Hub




Discussion and Ongoing Work

Small-scale agricultural enterprises need to use ICT solutions not only to survive during the pandemic but also to become more efficient in their operations. For example, using the virtual farmers market platform, vendors can track sales and product performance. This allows vendors to better plan future production and adjust pricing, as necessary. The solution developed for Riceville Farmers Market provides data that many of the vendors either would not track or would be labor-intensive to track manually.

Farmers often learn about new tools and technology platforms through their peers or through winter conferences and expositions. However, most of these solutions are geared toward larger farm businesses and include features that are not affordable or not needed by small and medium-scale producers (Burke, 2010). ICT solutions for these small and medium-scale farms are often ignored by industry, due to their small budgets. As of 2015, small-scale farms accounted for 90% of U.S. farms, based on income from farm operations (MacDonald & Hoppe, 2017). In addition, there is growing consumer demand for local food, which in turn supports the growth of small and medium-scale farms. The above two case studies

demonstrate the need to look deeper into the needs of small-scale agricultural enterprises and develop ICT solutions that cater to their specific requirements. These solutions need to be low-cost, easy to use and understand, and customized to meet specific needs (Mittal, Krejci, & Craven, 2018; Mittal, White, & Krejci, 2017).

Collaboration between academic institutions, nonprofits, and the local agricultural community could provide an effective way to cater to these requirements. Universities, through research and project collaborations, can provide the much-needed, low-cost technological skills and solutions and offer continued support as operations evolve. The collaboration specifically on this front can help bring students involved in the project much closer to their community and provide an understanding of the challenges faced by small-scale farmers on the ground while addressing their specific needs.

Ongoing work includes developing an online database, “FreshConnect,” that allows farmers in Iowa to post listings of their excess product inventories (Grimm & Mittal, 2020). The pandemic has disrupted the marketing channels of farmers. For example, producers who depend on sales to institutional customers have been left with a huge pile of unsold products due to restaurant and office closures, while on the other hand several CSA programs had to close registrations due to the huge spike in demand (Burger & Benz, 2020). Therefore, many farmers need to find alternative markets to be able to sell their food. As farmers list their products in the database, buyers (e.g., food hubs and school districts) will be able to access the available inventory and make purchasing decisions accordingly. Products will be removed from the list after a month from when they are listed. Other information collected from the farmers are their shipping needs, which may allow them to collaborate on transportation needs. 

References

- Burger, M., & Benz, S. (2020, August 5). *How has COVID-19 affected SFC farmers' markets?* Sustainable Food Center. Retrieved from <https://sustainablefoodcenter.org/latest/blog/how-has-covid-19-affected-sfc-farmers-markets>
- Burke, K. (2010). The impact of internet and ICT use among SME agribusiness growers and producers. *Journal of Small Business & Entrepreneurship*, 23(2), 173–194. <https://doi.org/10.1080/08276331.2010.10593480>
- Data USA. (2020). Data USA: Riceville, Iowa. Retrieved October 20, 2020, from <https://datausa.io/profile/geo/riceville-ia#demographics>
- Grimm, J., & Mittal, A. (2020). *FreshConnect Database*. Retrieved September 18, 2020, from www.freshconnectdatabase.com
- MacDonald, J. M., & Hoppe, R. A. (2017, March 6). Large family farms continue to dominate U.S. agricultural production. *Amber Waves*. Retrieved from <https://www.ers.usda.gov/amber-waves/2017/march/large-family-farms-continue-to-dominate-us-agricultural-production/>
- Mittal, A., Krejci, C. C., & Craven, T. J. (2018). Logistics best practices for regional food systems: A review. *Sustainability*, 10(1), 168. <https://doi.org/10.3390/su10010168>
- Mittal, A., White, V., & Krejci, C. C. (2017, May). A framework for collaboration among regional food system participants. In *Proceedings of the Industrial and Systems Engineering Conference*, Pittsburgh, PA, USA.
- Williams, C. (2020, May 2). Farmers markets scaling down with eye on safety due to virus. *NBC New York*. Retrieved from <https://www.nbcnewyork.com/news/coronavirus/farmers-markets-scaling-down-with-eye-on-safety-due-to-virus/2399318/>