The Rise, the Fall, and the Resurrection of the Egrocery Channel: A Transformation in Retail Logistics and U.S. Consumer Behavior

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ABSTRACT

Nearly 20 years ago this journal published "Where Have All The On-Line Grocers Gone?" about the growing online grocery market and correctly predicted that the concept would fail until logistics issues were resolved. This article considers the changes that have taken place since then and why there has been a resurrection and exponential growth in the eGrocery channel. It considers how the forced disruption from the COVID-19 virus has served to help further the development and growth of this channel.

EVOLUTION OF THE GROCERY INDUSTRY

More than ten decades have passed since the first modern American supermarket opened doors. In 1916, Piggly Wiggly supermarket pioneered a self-service model that redesigned food shopping strategies (Piggly Wiggly, 2011). Prior to that, customers would give the store clerk a list, and the clerk would personally pick out the groceries from the shelves, place them into bags and give them back to the customer (Ross, 2016).

The introduction of the shopping cart in 1936 shifted fulfillment away from the store clerk and placed fulfillment responsibility directly on the customer. This transformation allowed multiple customers to roam freely throughout the store and pick their own groceries from the shelves and collect them in a shopping cart. It required an extensive physical redistribution and reconfiguration of the stores to increase customer capacity, and lower costs, but it increased sales (Wilson, 1978). Previously, grocers considered consumption as a manner of "grocery hydraulics" rather than a matter of consumer psychology (Cochoy, 2009).

In the 1990's retailers began experimenting with the concept of online retailing, where goods would be shipped from central distribution centers directly to the consumer. This later evolved in some cases into e-shopping where the consumer would pick up their order at the store. However, by the early 2000's the online concept had largely failed. The authors of "Where Have All the On-Line Grocers Gone? Lessons Learned from the Demise of On-Line Grocers" (Farris and Wilson, 2002) investigated the online grocery market structure and concluded that the logistical elements made the concept cost prohibitive. In a thriving dot.com environment, startups had been flush with venture capital that covered inefficiencies and cost deficits in the short run. The industry did not evolve the model, and the concept failed when the start-ups burned through their cash. Rapid expansion, substantial investments in warehouses, high costs in operations, and costly transportation models were the principal reasons for ceasing operations for many early online grocers. A recent report shown in Table 1 points out that compared to other retail the grocery industry had fallen behind in modernization and application of technology. It also recognizes that the grocery industry has made significant improvements in recent years.

Smart shopping carts now offer checkout-free shopping with a built-in technology to automatically scan and charge the customer's item once it is placed into the cart. Artificial intelligence systems

[1] Throughout this paper, we use the term "eGrocery" to represent a channel that has developed supporting the overall grocery industry and recognizing that some sales figures include products that may be sold exclusively online and are not available in grocery stores.

TABLE 1
U.S. FOOD RETAIL EXECUTIVES' OPINIONS ON MODERNIZATION AND TECHNOLOGY IN GROCERY STORES
JUNE 2018

	% of Respondents*
While grocery stores may not be as tech-savvy as other retailers, they have come a long way over a short time	82%
The grocery store layout is changing to accommodate microvisits	72%
If grocery stores do not enter the modern age, more people will look for other ways to get their food	71%
Grocery stores serve a basic function and there is not a great need to change them drastically	50%
Grocery stores haven't figured out how to use technology like other retailers have	49%
Grocery stores haven't changed in decades and it's time they started to adapt to the modern age	46%

*Note: agree or strongly agree; (Garcia 2018)

tally customer purchases and post the results directly on the customer's phone via a mobile app (Boyle, 2019). For example, Amazon Go operates more than 20 cashier-less supermarkets where the customer uses an app to enter the store, take the products, and exit without human interaction checking out, all powered by computer vision and machine learning (Amazon, 2019).

Prior to COVID-19, Statista pre-COVID-19 projected potential eGrocery sales of $41.31 billion by 2021 and $59.3 billion by 2023 (Conway, 2020). Since this projection, the forced disruption from COVID-19 has served to further the development of eGrocery channels. Shakespeare penned the phrase "the past is prologue." We have learned from the past mistakes of the eGrocery channels from decades past in order to improve the eGrocery channel approach today and going forward.

EARLY eGROCERY FAILURES

Ordering groceries on the internet was initially expected to be a very promising opportunity to lower costs and increase revenue in an industry which typically has had only 1% to 3% profit margin. For customers, it was considered (and still is) a suitable option adding convenience, time, and labor-savings. Early studies pointed to development of the eGrocery channel as a means of improving the life of grocery consumers.

• A survey by the University of Michigan ranked 22 favorite household tasks and found that grocery shopping came in next-to-last, just ahead of cleaning (Henry, 2000).

• According to the Food Marketing Institute, the average American household made 2.3 trips to the grocery store a week and spent $87 per week on groceries (Richards, 1996).

• The average grocery trip took an estimated 47 minutes, not including time to drive, park and unload groceries (Linstedt, 1998).

Consider the difficult operating environment for the eGrocery industry:
• relatively low order value
• extremely low profit margins per item
• short product life
• compressed delivery windows
• restrictions on customer availability
• customized customer orders
• highly competitive market
• specialized costs in storage and transportation

While customers recognized and valued a home delivery system, many eGrocers could not compete with traditional bricks- and-mortar grocery retailers (Kämäräinen, et al., 2001). There were a number of failures due to excessive costs and misguided priorities due to irrational exuberance.

Early participants including Streamline, HomeGrocer, and Webvan ended operations, filed for bankruptcy, or were sold to competitors. Table 2 identifies the companies competing in the eGrocery channel in 2001. Many are still recognizable as thriving bricks-and-mortar retailers but exited the eGrocery channel.

Streamline started operations in November 1996 as a service providing home delivery groceries, movie rental, dry cleaning, and film. It delivered groceries on a weekly schedule from its own warehouses and put them away at the customer's property for a $30 monthly flat fee (Borrego, 2001). Shortly after a 1999 IPO, Streamline ceased operations and discontinued service in November, 2000 due to extremely high expenses to maintain their business model (WSJ, 2000).

HomeGrocer provided next-day delivery of fresh produce, seafood, and meat to more than seven U.S. states (CNN, 2000a). Online orders under $75 were charged a $10 delivery fee, while orders above $75 had no delivery charge (Fisher and Kotha, 2014). HomeGrocer developed all of its own technology including an award-winning website, wireless picking systems that used Wi-Fi, and a driver smart phone application, years before they were mainstream. Facilities were opened in Oregon, Washington, California, and Texas. Each 100,000 square foot facility operated 7 days a week with 50 delivery vehicles and a staff of 200. By June, 2000 daily sales exceeded $1 million per day. Construction started on 16 additional facilities in Georgia, Illinois, Washington, DC, and Colorado (Fisher and Kotha, 2014). In spite of raising $288 million with an IPO it was not enough to continue operations. In September, 2000 stockholders approved a $1.2 billion all-stock sale to Webvan (Sandoval, 2002). After the sale, the brand's sales peaked in November, 2000 at $1.5 million daily. Amazon eventually bought the brand in 2002 for $42.5 million (c|net, 2002).

Webvan initially started developing their concept in 1997. Under their model, customers would order online and specify a delivery time. Groceries were delivered to the customer the next day within a 30-minute window (Aspray, et al., 2013a). Investors pressured the company for very fast growth in order to capture first-mover advantage. Webvan responded by placing a $1 billion order with Bechtel to build warehouses and bought a fleet of delivery trucks (Wolverton, 2001). This rapid growth has been cited as one of the reasons for the failure of the company. Webvan started taking orders in the San Francisco Bay Area in June 1999. By 2000, it had $178.5 million in annual sales but $525.4 million in annual expenses, servicing 10 U.S. cities and hoping to expand to 26 cities by 2001 (CNN, 2001; Goldman, 2015). Venture capitalists invested more

TABLE 2
TOP 30 RANKING U.S. eGROCERS IN THE 3rd QUARTER OF 2001

1. Marsh	11. Why Run Out	21. Net Grocer
2. Harris Teeter	12. Stater Bros	22. Ethnic Grocer
3. Giant Food	13. Easy Grocer	23. Grocer Online
4. Albertson	14. Publix	24. Kroger
5. Stop & Shop	15. Walgreens	25. Metro Food Market
6. Bashas	16. Simon Delivers	26. Electric Food
7. Peapod	17. My Web Grocer	27. Your Grocer
8. Schnucks	18. Market One Stop	28. Groceries Express
9. Hy-Vee	19. House Calls Online	29. Bluelight
10. Ingles Markets	20. Price Chopper	30. Giant

(Lim, et.al 2004)

than $396 million and the company raised an additional $375 million in an IPO which valued the company at more than $4.8 billion (Richtel, 1999). Up to the time of the IPO, the company had reported cumulative revenue of $395,000 and cumulative net losses of more than $50 million (SEC, 1999) and had spent between 25% and 35% of its revenue on advertising (compared with about 1% for traditional grocery chains). It filed bankruptcy in June 2001 losing $830 million (Delgado, 2001).

Key reasons contributing to Webvan's failure include:
• Excessive initial fixed cost investments of $35 million for each warehouse (Hays, et al., 2005)
• High operating costs of $125 million per quarter (Aspray, et al., 2013a).
• Not effectively utilizing capacity. Their warehouses averaged 350,000 square feet each, the equivalent to 18 average grocery stores, and were running at one-third capacity (Aspray, et al., 2013b)

• High cost of customer acquisition and retention. The company invested $210 to acquire a new customer while achieving less than a 50% customer return rate (Aspray, et al., 2013b).

Many early online grocery retailers, such as Webvan, Netgrocer, and Peapod were considered e-tailers or pure-play companies because they would only sell over the internet and fulfilled out of warehouses. This was a "click" strategy and companies found it difficult to provide comparable customer service to that offered by conventional retailers using a "brick strategy." Since the early failures, many grocers have adopted a "bricks-and-click, also known as online-plus-physical-stores, strategy" (Lim, et al., 2001).

Not all the eGrocery businesses failed. Peapod started in 1989 and introduced online grocery features such as personalized specials, digital coupons, and online lists early in its business model with a delivery fee of $6 and two-hour delivery windows. It required customers to physically download software from CD-ROMs onto their computer to place a grocery order and would then fulfill the groceries from Jewel stores and deliver them to the customer (Dalke, 2017).

Unlike other eGrocers, Peapod worked in partnership with local groceries. Peapod pioneered many of the online grocery ordering tools that are commonplace today, such as being able to sort by price, description, and size. It was the first grocer to use digital coupons, personalized specials, and allow shoppers to create online lists. It was the first company to have software that recalled past order history so the customer could easily reorder items in the future (Dalke, 2017).

By 2017, Peapod was in 24 markets, mostly in the Midwest and Northeast, with more than 2,000 full-time employees along with over 350 part-time workers and 600 product selectors (Dalke, 2017). After Royal Ahold bought Peapod, they cancelled their contracts with all grocery companies except for Royal Ahold's two main American chains - Stop & Shop and Giant Food - (PYMNTS, 2017) and February 2020, announced they would be ceasing operations in the Midwest (Illinois, Indiana, and Wisconsin) and focus exclusively on serving the East Coast markets (Elejalde-Ruiz, 2020).

It is estimated in 2018 that people spent an average of $121 for Peapod orders, compared to $72 at Walmart Pickup Grocery and $60 with AmazonFresh in 2018. Peapod had a 93% satisfaction rating. 40% of Peapod's shoppers were millennials compared to 25% of people who visited Ahold bricks-and-mortar store — making the food delivery company a key way for Ahold to expand its customer base (Doering, 2018).

EARLY FULFILLMENT MODELS

There were initially two types of fulfillment models; dedicated fulfillment centers (DFC) and in-store fulfillment centers (SFC):
• Dedicated Fulfillment Centers (DFC): Used by Streamline, Homerun, WebVan, and GroceryWorks to process orders, this model is a warehouse/depot model which takes the retail store out of the cost

structure by delivering directly from the warehouse. It consolidates delivery of multiple product classes as well as services to the home, with a lower cost structure (Casper, 1998). Streamline offered an innovative, but labor intensive approach to using this model. A setup team was dispatched to a customer's house where the contents of the kitchen were scanned to create a personal shopping list which typically accounted for 70% to 75% of a family's weekly order. The family was given a UPC code list as its core shopping list, plus another list of the products and services available through Streamline including video rentals, dry cleaning, and bottled water. To order, family members checked off from their core list and the additional services list to identify their weekly needs. As long as the order was placed by midnight, delivery would take place by 6 p.m. the next day. Customers received a combination refrigerator, freezer/dry storage cabinet measuring 5 feet wide by 5 feet high by 2 feet deep which was placed in their garage. Streamline operated a fleet of trucks with three different temperature zones to maintain the integrity of the products and made weekly deliveries to the box. Streamline customers paid a box installation charge of $39 and a monthly fee of $30 (Matthew 1999). The average Streamline customer ordered goods 47 times per year and spent an average of $5,200 per year. Box installation and monthly fees accounted for 7.7% of the annual expenditure by the customer (Liebeck, 1997a).

• In-store Fulfillment Centers (SFC): Used by Peapod and Tesco this model tapped into the existing logistics infrastructure, utilizing retail stores for fulfillment. Peapod bridged the gap between store and home and charged for the service (Casper, 1998). In its early days as a Chicago-area start-up, Peapod fulfilled orders by picking items from the shelf of a local Jewel grocery chain. Their delivery costs averaged about $12 per order. A typical Peapod customer would spend $120 per order (Lindsay, 1999) and was charged a $4.95 flat monthly fee per order and 5% of the total order. The additional cost per order averaged $13.42 or about 11.2% (Leibs, 1997).

THE RESURRECTED eGROCERY CHANNEL

The eGrocery channel concept has continued to evolve and capture an increasing share of the grocery market. In 2018 a study suggested 42% of people would rather be stuck in rush hour traffic in Manhattan than not be able to do their shopping online (DHL, 2018). The forced disruption from COVID-19 may be enough of an incentive to force eGrocery channels to mature and become embedded into consumer purchasing behavior.

Between 2016 and 2018 the eGrocery channel doubled in size. (Magana, 2019) Pre-COVID-19 projections, close to the estimates cited for Statistica, suggested by 2021, U.S. eGrocery sales could reach $38.16 billion and be as high $59.5 billion by 2023. In spite of the market share growth in the U.S., it pales in comparison to growth elsewhere in the world, as shown in Table 3. China is the biggest digital grocery player in the world, with eGrocery revenues expected to nearly quadruple by 2023. (Kats, 2019).

Table 4 shows that nearly one-third of digital grocery shoppers in the Netherlands, the U.K., Germany and France had groceries delivered at least weekly in 2018. Pre-COVID-19, Capgemini projected by 2021 more than half of respondents in the Netherlands, U.K. and Germany will have groceries delivered once per week (Kats, 2019).

Domestically, eGrocery shopping in the United States continues to grow. Table 5 suggests that prior to COVID-19 U.S. shoppers were gradually adopting and using the concept with a sizable increase in 2019.

Contrast the 2001 list of eGrocers in business shown in Table 2, with the list in Table 6 which reflects eGrocery market share in 2019. By 2019 three competitors, Amazon, Walmart, and Target held 81% of the market (Droesch, 2020).

Table 7 offers a slightly different perspective reflecting growth from 2018 to 2019. This may be

TABLE 3
DIGITAL GROCERY SALES IN SELECTED COUNTRIES, 2018 AND 2023
(Billions, % of total digital sales and CAGR)

| | 2018 | | 2023 | | |
	Sales	% of digital sales	Sales	% of digital sales	CAGR
China	$50.9	3.8%	$196.3	11.2%	31.0%
U.S.	$23.9	1.6%	$59.5	3.5%	20.0%
Japan	$31.9	7.1%	$46.5	9.9%	7.8%
U.K.	$14.6	6.0%	$22.1	7.9%	8.7%
South Korea	$9.9	8.3%	$21.3	14.2%	16.5%
France	$11.6	4.5%	$17.2	6.0%	8.2%
Australia	$2.1	2.1%	$4.2	3.7%	15.3%
Germany	$1.3	0.5%	$3.8	1.2%	23.2%
Canada	$0.8	0.8%	$2.1	1.8%	0.8%
Spain	$0.9	0.7%	$2.0	1.4%	0.7%
TOTAL	$147.9		$374.9		20.4%

(Kats 2019)

TABLE 4
DIGITAL GROCERY SHOPPPERS IN SELECT COUNTRIES THAT HAVE GROCERIES DELIVERED ONCE A WEEK OR MORE
(% respondents, 2018 and 2021 (Pre-COVID19 projected)

	2018	2021
Netherlands	43%	62%
U.K.	43%	56%
Germany	38%	56%
U.S.	38%	52%
France	37%	49%
Worldwide	40%	55%

Note: ages 18+, Internet users who have
purchased groceries online in the past 6 months;
(Kats 2019)

TABLE 5
U.S. INTERNET USERS ONLINE GROCERY SHOPPING BEHAVIORS, 2015-2019
(% of respondents)

	Purchased Groceries Online	Purchased Groceries Online Regularly
2015	34%	11%
2016	31%	12%
2017	35%	13%
2018	38%	17%
2019	56%	37%

Note: ages 18+; (TABS Analytics 2019)

TABLE 6
WHERE DID U.S. INTERNET USERS BUY GROCERIES ONLINE?
(% of respondents, 2015-2019)

	2015	2016	2017	2018	2019
Amazon	14%	16%	25%	24%	36%
Walmart	12%	12%	14%	15%	29%
Target	7%	5%	9%	9%	16%
Grocery Banner	16%	11%	7%	9%	10%
Jet	-	1%	5%	2%	3%
Peapod	2%	1%	2%	2%	2%
Netgrocer	0%	0%	2%	1%	1%
FreshDirect	2%	2%	2%	1%	2%
Other	2%	0%	1%	2%	2%
None	66%	69%	65%	62%	44%

Note: ages 18+; (TABS Analytics 2019)

TABLE 7
TOP 10 DIGITAL RETAILERS, RANKED BY U.S. eGROCERY SALES
(% change 2018 vs. prior year)

	Sales	Percentage Change
Amazon	$8,200,000,000	12.5%
Walmart	$2.840,000,000	10.1%
Kroger	$1,510,000,000	66.0%
Royal Ahold	$1,170,000,000	2.6%
HelloFresh	$960,000,000	41.0%
Costco	$880,000,000	12.0%
FreshDirect	$670,000,000	3.8%
Bluer Apron	$670,000,000	-24.9%
Albertsons	$590,000,000	4.9%
Target	$420,000,000	28.9%

(Katz 2019)

due to a different definition of what constitutes the term "groceries" or represents ownership in a different manner. For example, Ahold owns Peapod.

Amazon's 2018 sales increase has been fueled by their evolving omnichannel grocery strategy. In May, 2018, Amazon expanded its same-day Whole Foods delivery service into 88 U.S. markets and plans to open thousands of Amazon Go stores by 2021. Walmart's sales growth has been fueled by Walmart's large brick-and-mortar footprint which gives them the opportunity to develop curbside pickup capabilities. 76% of U.S. shoppers prefer Walmart's curbside pickup to 14% who prefer to shop in-store. Kroger saw the biggest year-to-year gain of 66% by expanding home delivery capability to 91% of available households and making grocery pickup available at 1,581 of its 2,764 stores (Koch, 2019).

FOCUSING GROWTH IN URBAN MARKETS

Markets with a denser concentration of customers and shorter travel distances to the customer make the most economic sense for growing eGrocery channels. Table 8 identifies the share of the eGrocery market in top metropolitan areas and is sorted by population.

TABLE 8

ONLINE GROCERIES – JUNE 2019 SHARE OF CUSTOMERS
(Top Metropolitan areas by Population)

	Walmart Grocery	Instacart	FreshDirect	Peapod	Amazon Prime Now	Shipt	AmazonFresh
NYC	-	15%	31%	14%	18%	1%	20%
Los Angeles	9%	42%	-	-	26%	1%	21%
Chicago	19%	31%	-	10%	20%	6%	14%
DFW	59%	14%	-	-	13%	2%	10%
Houston	39%	25%	-	-	15%	21%	-
Wash DC	18%	35%	1%	7%	22%	2%	13%
Miami	14%	45%	-	-	19%	11%	11%
Philadelphia	20%	33%	6%	10%	21%	1%	7%
Atlanta	35%	40%	-	-	12%	6%	8%
Boston	8%	26%	-	14%	36%	1%	14%
Phoenix	56%	22%	-	-	19%	1%	-
San Francisco	-	40%	-	-	35%	1%	-

(Rieck 2019)

eGROCERY LOYALTY

eGrocery shoppers are loyal. Most Americans regularly shop at just one or two grocery stores, so it is not surprising that most online grocery shoppers also stick with their favorite service (Rieck, 2019). Once a customer tries shopping with an eGrocery channel and decides to continue using the channel, they typically continue to use that provider and do not readily switch to another provider (Rafiq and Fulford, 2005). This is in contrast to the meal delivery industry, where diners frequently hop between apps to get the broadest selection of restaurants. As the eGrocery market increases, capturing market share will come from obtaining new customers to the concept instead of luring them from the eGrocery competition. Table 9 reflects that the highest potential conversions in 2019 came to Instacart who provided service to 5% to 13% of customers using other services.

While initially online shopping was viewed as a separate channel to sell groceries, many retailers have realized the need to add online channels to existing traditional distribution channels to provide a customer-oriented multichannel experience and keep their market share (Herhausen, et al., 2015). It

has been recognized that physical stores are key for supporting an eGrocery channel. A hybrid business model using physical stores as well as warehouses to support fulfillment has been adopted to bolster both online and offline services. Presently Albertsons, ShopRite, Loblaws, Stop & Shop, and Sedano's use this model (Dudlicek, 2020).

Hy-Vee's eGrocery concept involved fulfilling orders at its four fulfillment centers but found that it was unable to match the service levels afforded by personalized shoppers and same-day pickup at the store. It shifted to fulfillment at its retail locations as well as partnering with Instacart and Shipt for grocery delivery.

Amazon entered into the grocery business in 2007 with Amazon Fresh, a grocery delivery company where consumers shop online and receive same day or next morning delivery service (Page, 2019). In 2016 the company introduced its first physical bricks-and-mortar retail store 'Amazon Go' that uses technologies such as computer vision, deep machine learning, and sensor fusion without cashier operators, and with minimal human interaction (Cheng, 2019). The 'Grab-and-go' shopping concept uses an electronic recipient application to

	Shipt	Instacart	Walmart Grocery	Peapod	FreshDirect	Amazon Prime Now	AmazonFresh
Shipt	-	10%	9%	0%	0%	7%	1%
Instacart	3%	-	7%	1%	1%	8%	3%
Walmart Grocery	2%	5%	-	0%	0%	2%	0%
Peapod	1%	7%	1%	-	4%	4%	4%
FreshDirect	0%	6%	0%	3%	-	7%	7%
Amazon Prime Now	3%	13%	5%	1%	2%	-	7%
AmazonFresh	1%	10%	1%	2%	4%	13%	-

(Rieck 2019)

register, check out, and charge the product while the customers leave the store (Johnston, 2018). The strategy used in Amazon Go stores is an innovation from the self-checkout version concept that many retailers use in brick-and-mortar stores today (Polacco and Backes, 2018).

BUSINESS MODELS

Although food retailers are struggling to meet demand for home delivery in the COVID-19 crisis (Ryan, 2020), there are two business models that are being used for current eGrocery operations.

1. Store pickup. Customers order online and pick up at the store usually for free or a very low cost. This model is preferred over in-store shopping among young, busy, and affluent professionals, with children (Thakker, 2019). As COVID-19 restrictions started to be imposed, grocery retailers experienced significantly reduced in-store foot traffic and turned to the curbside business model while accommodating social distancing practices (Melton, 2020).

2. Home Delivery. Customers order online and items are picked at the store and delivered to customer homes, usually for an annual subscription. Walmart offers an annual subscription of $98 or $12.95 per month or $7.95 per same-day delivery with unlimited numbers of orders per customer (Dumont, 2019). Walmart installs a smart lock or smart garage door opener on the home, which gives the Walmart delivery employee a one-time entry code. Each employee also wears a video camera that records the delivery, and the footage can be viewed live or later the customer's smartphone. The app notifies customers when the employee arrives and leaves (Lore, 2019). Similarly, Amazon offers unlimited online grocery which delivers from its brick-and-mortar stores (Disis, 2017; Monica, 2017).

IMPROVING FULFILLMENT

A successful fulfillment strategy relies on giving customers what, when, and how they want it at the lowest possible cost (Ricker and Kalakota, 1999). However, this is not always possible given the nature of the market. When the eGrocery boom began in 2015, SKUs at average warehouse or fulfillment centers increased by 18.5 percent. The increased demand on pick, packing and shipping operations left many operations short-handed as they aimed to fulfill orders at a faster rate. To reduce costs, increase efficiency, and keep profitable margins online retailers need to control "picking" costs. In 2018 food retailers incurred a $5 to $15

TABLE 10
CURRENT vs. PLANNED OMNICHANNEL FULFILLMENT CAPABILITIES
ACCORDING TO LOGISTICS PROFESSIONALS, WORLDWIDE, 2017
(% of respondents)

	Current in 2018	Planned by 2028
Stores enabled to fulfill web orders	63%	96%
Stores enabled to ship to warehouse or direct to consumers	52%	95%
Stores enabled to transfer product between store locations	50%	96%
Direct ship from manufacturer or other retailer	45%	93%
Dedicated fulfilment centers for online	44%	96%
Shared fulfillment centers for offline and online	41%	95%
Regional/nearshoring of fulfillment centers	40%	93%

(Zebra Technologies 2018)

loss on every manually picked order and losses will be higher as online orders increase (Ladd, 2019). The picking in-store "bricks-and-mortar" shoppers experienced congested aisles competing with store workers serving as "personal shoppers," other customers, and third parties' services personnel (Meyersohn, 2019).

Table 10 offers an inventory of the current capability and pre-COVID-19 projections of fulfillment capability by 2028.

Some eGrocers are implementing robotic fulfillment technology to reduce labor, and increase speed and efficiency of fulfillment, while releasing pressure on store inventory (Cosgrove, 2019; Wells, 2019). For example, Albertsons has built automated mini-warehouses inside their stores and opened up "dark stores" - locations that look like supermarkets but are closed to customers - to make deliveries and prepare pickup orders. As a customer enters their order using Albertsons' e-commerce interface, the order is delivered to the automated system which handles the fulfillment process. AI-enabled robots and a system of totes and conveyors collect items for online grocer orders in minutes (Moralez, 2019). Whole Foods followed suit in 2020 as part of its response to meeting the increased demand stemming from COVID-19 (Tyko, 2020). Execution of the Micro Fulfillment Centers (MFCs) is complex and it still requires a high volume of

order to become economically profitable. But back-of-store-automated robotic systems are capable of collecting 800 products an hour, and bagging them for home delivery or pick up at store by customers, filling orders 10 times faster and more accurately than store workers (Nassauer, 2020).

MANAGING THE LAST MILE

Companies need to optimize not only internal fulfilment processes but also the transportation costs for the last-mile delivery. Last-mile distribution accounts for 25% to 50% of transportation total supply chain costs (Stiffler, 2020). For retailers in the food and grocery segment, a smooth and satisfactory delivery to the customer is more significant than ever. Meeting demand and service-level expectations impacts profitability as consumers expect faster, more frequent and often-times free delivery.

The development of "Buy Online, Pick Up in Store," also known as BOPUS, has been one of the key drivers in the growth of the eGrocery channel. As shown in Table 11 and Table 12 the number of retail locations offering BOPUS nearly doubled in 2018 among U.S. grocery retailers including Walmart, Kroger and Target, increasing the collective number of click-and-collect locations from 2,451 to 5,800 (Koch, 2019).

TABLE 11
NUMBER OF CLICK-AND-COLLECT LOCATIONS FOR SELECT MAJOR U.S. RETAILERS
(January to December 2018)

January 2018	June 2018	December 2018
2,451	3,414	5,800

Note: Company data analyzed includes Walmart (and various third-party partners), Kroger, (and Instacart), Target (and Shipt), Ahold and Albertsons; (CommonSense Robotics 2019)

TABLE 12
RETAILERS SIGNIFICANTLY EXPANDED PICKUP LOCATIONS IN 2019
(Total number of curbside grocery pickup locations by retailer)

	2018	2019
Walmart	2,050	3,050
Kroger	1,600	1,800
Target	1,000	1,750
Instacart	250	1,500
Albertson's	450	600
Ahold/Peapod	200	600
Amazon/Whole Foods	25	100

(Ford 2020)

While the BOPUS concept continues to grow and catch hold, Table 13 and Table 14 suggest customers still prefer to have their orders delivered to their home. BOPUS is still not the preferred means for the customer to receive their order.

Cost of delivery continues to vary from provider to provider. Table 15 offers an example of the expenses incurred by the customer for eGrocery delivery options in 2020.

THE FORCED DISRUPTION OF COVID-19 HAS HELPED SERVE AS A CATALYST FOR ACCEPTANCE

On January 20, 2020 the first confirmed case of COVID-19 in the United States was reported at the Providence Regional Medical Center in Edmonds, Washington (Holshue, et al., 2020). While the COVID-19 impact on eGrocery is yet to be completely measured, the forced disruption caused by self-quarantine, social distancing guidelines, and travel restrictions have served as a catalyst for many consumers to try using eGrocery channels. This may result in a significant boost to help increase acceptance of eGrocery channel options (Back, 2020).

Table 16 suggests older consumers were more likely to embrace social distancing requirements during the COVID-19 crisis. More than 8 in 10 (85.6%) respondents ages 60 and older in February, 2020 indicated they were likely to avoid shopping centers and malls. That is not surprising given that COVID-19 hits older people the hardest, but it may have had an unintended consequence on their shopping habits. Since older individuals are the ones for

TABLE 13
DELIVERY METHODS USED BY U.S. INTERNET USERS FOR DIGITAL PURCHASES BY AGE, MAY 2018
(% respondents in each age group)

	18-29	30-39	40-49	50-59	60+	Total
Deliver to home	83.1%	80.5%	80.6%	69.4%	74.2%	75.4%
BOPUS	24.6%	18.8%	23.5%	20.7%	13.7%	18.0%
Ship-to-store	12.3%	11.3%	14.7%	9.5%	6.8%	9.5%
Deliver at work	6.2%	11.3%	10.6%	5.0%	3.4%	6.0%
Curbside pickup	3.1%	4.5%	5.9%	1.2%	0.8%	2.3%
Deliver to locker	3.1%	0.8%	0.0%	0.4%	1.0%	0.8%
Other	0.0%	0.8%	2.4%	1.2%	0.8%	1.1%

Note: In the past month/30 days; (eMarketer Ecommerce Insights Report May 2018)

TABLE 14
HOW INTERNET USERS PLAN TO USE PICKUP OR DELIVERY SERVICES
(% of respondents, Feb 2019)

	Definitely Would Use	Probably Would Use	Probably Would NOT Use	Definitely Would NOT Use
Germany				
Delivery	78%	17%	3%	2%
Store Pickup	21%	38%	29%	12%
U.S.				
Delivery	72%	20%	5%	3%
Store Pickup	41%	37%	16%	6%
U.K.				
Delivery	69%	22%	7%	2%
Store Pickup	47%	30%	16%	7%
France				
Delivery	63%	29%	6%	2%
Store Pickup	37%	44%	14%	5%

Note: ages 18-69; (McKinsey 2019)

whom the virus has been most fatal, they may be especially likely to alter their behavior. This could mean increased adoption of ecommerce, an area where they have been laggards (Enberg, 2020).

To further support the argument that COVID-19 would increase the number of consumers considering eGrocery channels we need only to look at China where there was a significant increase in the number of downloads of eGrocery apps as COVID-19 infections worsened. Figure 1 uses the number of eGrocery application downloads on January16 as a base. As the number of known cases grew after the first known infection in the United States on January 20, downloads increased by as much as 585% of the January 16 base (Wernau, 2020).

In China and South Korea, where there were the earliest confirmed cases of coronavirus on December 31, 2019 (Taylor, 2020), consumers increased their reliance on e-commerce. Food

TABLE 15
EXAMPLES OF eGROCERY DELIVERY COST
(March 2020)

	Grocery Delivery	Store Pickup
Target	$99 for an annual Shipt plan	n/a
Amazon Fresh	Free for Amazon Prime members	n/a
Aldi	$5.99	$4.99
Kroger	$9.95	Free
Walmart	Free for orders $30 or more	Free for orders $30 or more
Wegmans	$5.99	Free
Costco	No fee for orders of $75 or more	Free
Whole Foods	Free for Amazon Prime members	Free for Amazon Prime members
Albertsons	$5.99	$3.95 to $4.95 depending on location
Publix	Prices vary; uses Instacart	Prices vary
Sprouts	$3.99 plus a 5% service fee	Fees start at $1.99

(Castellano, 2019)

TABLE 16
U.S. INTERNET USERS WHO ARE LIKELY TO AVOID STORES IF THE
CORONAVIRUS OUTBREAK WORSENS IN THE U.S., BY AGE, FEBRUARY 2020
(% of respondents in each group)

Age	Shopping Centers/Malls	Shops in General
18-29	67.9%	44.7%
30-44	67.8%	55.5%
45-60	79.3%	53.8%
61+	85.6%	61.1%
TOTAL	**74.6%**	**52.7%**

Note: n=1,121; on February 28 Coronavirus totals were over 83,000 known cases worldwide with 2,923 deaths, 64 known cases in the U.S.; (Enberg 2020)

delivery spending in China shot up 20% in January while some South Korean grocers saw triple-digit online sales increases. Similarly following suit in February, 2020 21% of U.S. shoppers bought perishable groceries online, up from 18% during the same period last year. Figure 2 reflects the major demand increase in Chicago where online grocery orders spiked two to three days after major news announcements involving COVID-19 (Wells, 2020a).

Some stores were quickly overwhelmed by the COVID-19 surge in demand. Grocers shifted workers into e-commerce fulfillment roles as ninety percent of their business shifted to online because nobody was leaving their home. Stores that previously had one or two workers picking and packing online orders changed to as many as 20 doing those jobs (Wells, 2020b).

In March, the RetailX Coronavirus Consumer Confidence Tracker (RetailX, 2020) reported 14.2% of U.K. internet users ages 18 and older increased their online grocery shopping as shown in Table 17. The U.K.'s leading online-only supermarket Ocado saw its website and app crash multiple times on March 13. Some customers who

## FIGURE 1
CHINA TURNS TO eGROCERY APPS DURING COVID-19
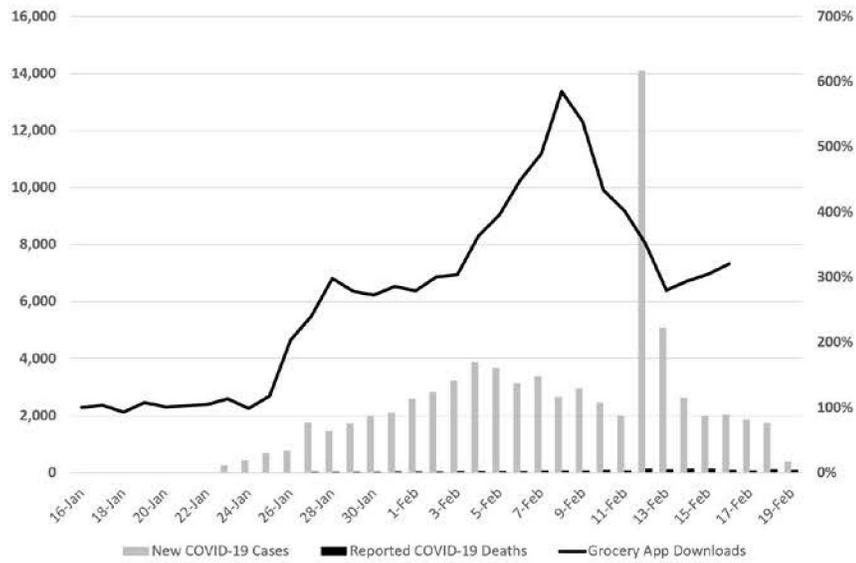
	Grocery App Downloads	New COVID-19 cases in China	Reported Deaths in China
1/16	100.000%		
1/17	103.622%		
1/18	92.749%		
1/19	107.880%		
1/20	101.206%		
1/21	103.106%		
1/22	104.849%		
1/23	113.325%	259	8
1/24	98.902%	457	16
1/25	117.537%	688	15
1/26	203.359%	769	24
1/27	240.294%	1,771	26
1/28	298.301%	1,459	26
1/29	278.470%	1,737	38
1/30	272.551%	1,981	43
1/31	286.031%	2,099	46
2/01	279.540%	2,589	45
2/02	300.740%	2,825	57
2/03	303.648%	3,235	64
2/04	363.572%	3,884	65
2/05	395.115%	3,694	73
2/06	448.765%	3,143	73
2/07	489.756%	3,385	86

2/08	585.020%	2,652	89
2/09	539.134%	2,973	97
2/10	433.667%	2,467	108
2/11	402.351%	2,015	97
2/12	351.949%	14,108	146
2/13	280.395%	5,090	121
2/14	294.128%	2,641	143
2/15	304.944%	2,008	142
2/16	320.303%	2,048	105
2/17		1,888	98
2/18		1,749	136
2/19		391	114

Numbers reflecting known cases and deaths in China (Worldmeters, 2020 https://www.worldometers.info/coronavirus/country/china/) combined with data from Wernau 2020.

FIGURE 2
ORDERS IN CHICAGO DURING CONFIRMED CORONAVIRUS CASES
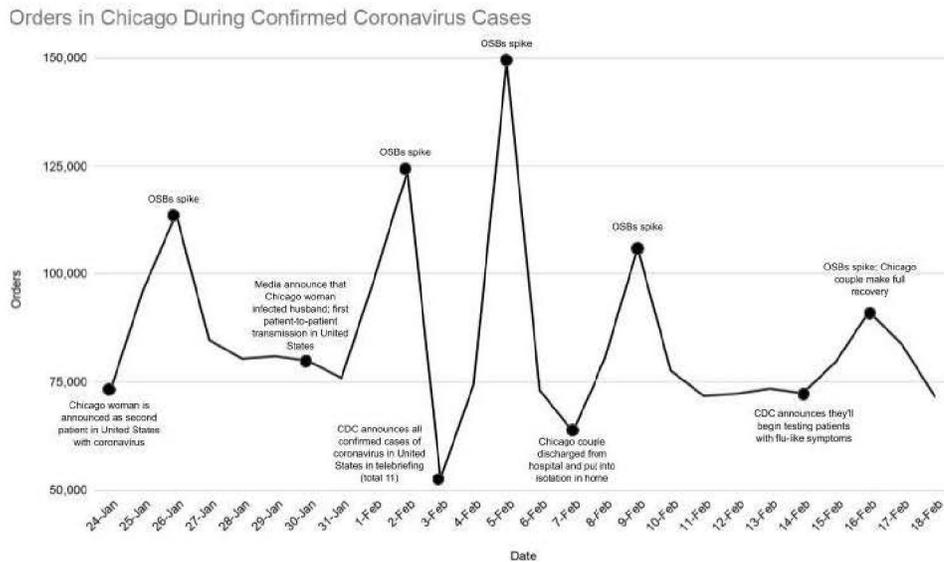
(Wells 2020a)

managed to place orders found that they could not book a delivery sooner than a week away. Several days later, the firm temporarily suspended access to Ocado.com and refused all new orders to concentrate on work behind the scenes. A March 19 statement confirmed that the grocer was "fully booked and at full capacity and would be delivering to over 170,000 households in the next four days."

As of March 20, Ocado site visitors were greeted with an update: "The website is currently only available for customers with a delivery booked for this Saturday and Sunday."

the United States Instacart developed a new "Leave at My Door Delivery" service offering the option to have groceries left at the customer doorstep at a

TABLE 17
HOW THE CORONAVIRUS AFFECTED U.K. INTERNET USERS DIGITAL SHOPPING
(% respondents, by category, March 2020)

	Stopped Completely	Reduced	No Change	Increased
Shopping for groceries	4.0%	3.8%	78.0%	14.2%

Note: ages 18+; (RetailX 2020)

TABLE 18
PROJECTED CHANGES IN IN-STORE vs DIGITAL PURCHASING HABITS IN THE U.K.
(% of respondents, by demographics, May 2020)

	Will shop more digitally	Nothing will change	Will shop more in-store
Gender			
Female	40%	52%	7%
Male	44%	51%	5%
Age			
18-25	46%	44%	10%
26-35	59%	35%	6%
36-45	43%	53%	4%
46-55	37%	58%	5%
56-65	31%	62%	7%
66+	31%	64%	6%
Total	**42%**	**52%**	**6%**

ChannelAdvisor, "COVID-19 Consumer Shopping Habits" in collaboration with Dynata, May 22, 2020. Note: May 21-24 n=1.002 ages 18+; compared to before the coronavirus pandemic

designated time instead of being hand-delivered. The new service had been in the testing phase but was rolled out to all customers. At the same time, due to COVID-19 isolation, the company sales jumped by a factor of ten times and in some places such as California and Washington by a factor of twenty times (Sampath, 2020).

The disruption caused by COVID-19 boosting demand quickly exposed flaws or gaps in the eGrocery channels. How the industry addressed and corrected these flaws has helped make the eGrocery channels stronger and increase acceptance.

HOW COVID-19 HAS IMPACTED eGROCERY USE

As we continue to be impacted by the on-going COVID-19 infections we are starting to see changes in consumer behaviors and the use of the eGrocery channels. Table 17 offers early insight in March in the U.K. reflecting an increase in the use of digital shopping for groceries. By May 2020,

TABLE 19
ONLINE GROCERY DELIVERY AND PICKUP
(Prior 30 days)

	August 2019	March 2020	April 2020	May 2020	June 2020
Sales (Prior 30 days)	$1.2 B	$4.0 B	$5.3 B	$6.6 B	$7.2 B
Spend (Average per Order)	$72	$85	$85	$90	$84
Orders (# Prior 30 days)	16.1 M	46.9 M	62.5 M	73.5 M	85.0 M
Customers (# Active during prior 30 days)	16.1 M	39.5 M	40.0 M	43.0 M	45.6 M
Frequency (Monthly average / customer)	1.0	1.2	1.6	1.7	1.9

(Kleckler 2020)

surveys of U.K. shoppers shown in Table 18 reported changes in purchasing habits across all ages. It is notable that while the older respondents were less likely to change, approximately one-third indicated they would shop more digitally.

Table 19 offers a longitudinal perspective of the changes in the use of eGrocery channels before COVID-19 in August, 2019 and during the summer months as COVID-19 infection continued to grow (Kleckler, 2020). This reflects significant growth in the use of eGrocery channels.

IMPLICATIONS FOR PRACTITIONERS

The expected increase of eGrocery channel use resulting from COVID-19 has led to the development of new avenues and approaches to reach a wider variety of customers such as development of the 'dark store' concept.

On-going improvements have required investments in logistics and online marketing. Makers of consumer staples have found that they are in a race to secure prominent online slots with eGrocery retailers and must develop new forms of digital advertising and promotion. The shift to online shopping likely will increase price transparency and competition across the board, pressuring margins for the whole industry (Back, 2020).

One of the biggest challenges retailers faced, as COVID-19 developed, was a surge in eGrocery demand, and the need for syncing up their inventory with online availability and demand. As eGrocery grows this represents a critical hurdle which must be overcome. Grocers traditionally had to keep close track of how many SKUs of toilet paper, for example, they had coming into their warehouses or store backrooms. But with the movement of product onto shelves and into shoppers' baskets accelerating, at unprecedented speed, retailers struggled to know what was available for online fulfillment (Wells, 2019).

IMPLICATIONS FOR RESEARCHERS

There are a number of research questions for academic researchers to investigate. For example:
• Why are eGrocery customers so loyal to their provider?
• Does the "cost to change" influence consumer decisions to change channels?
• Why does eGrocery acceptance differ by country?
• How does eGrocery acceptance differ by age?
• How can eGrocery reach the older population who are independent, live alone, and are not close to family members, may not have smart phones and are not computer savvy?

• How does eGrocery acceptance differ by gender?
• How does eGrocery acceptance differ by economic standing?
• How does eGrocery acceptance differ by race?
• What are the key factors that increase the likelihood of using an eGrocery channel?
• Which investments or improvement to the process offer the greatest leverage to improve the eGrocery channels?

• How does the "last mile" differ from the "middle mile" for eGrocery fulfillment?
• How does eGrocery channel pricing and profitability differ from traditional grocery channels?

CONCLUSIONS

eGrocery channels have resurrected from the failures of the early 2000's as we have learned how to effectively manage fulfillment and we continue to innovate with last-mile issues to further drive down cost. While the impact of the COVID-19 pandemic is yet to be completely known it is likely that it will serve as a means to further boost customer's acceptance of eGrocery channels. eGrocery channels are being stressed and tested under conditions that will build, strengthen, and change online business practices on the long term.

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