How digital technology is transforming the food retail landscape

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INTRODUCTION

Digital technologies are electronic tools, systems, devices and resources that generate, store or process data (GeSI and Deloitte, 2019). These technologies have a profound impact on the way we grow, distribute, market and purchase foods at local, national and global levels (Jouanjean, 2019). Countries need to create healthy and safe diets and resilient food systems to address malnutrition in all its forms to achieve the 2030 Sustainable Development Goal Agenda (Sachs et al., 2019). Retailers, supermarkets and chain restaurants are powerful agrifood-system stakeholders that use digital technologies and digital marketing strategies to make food supply chains safe, healthy, efficient and sustainable. They also influence the availability and pricing of products, improve efficiency to reduce food loss and food waste and broaden the array of healthy and affordable choices available to enhance people's diet quality and health (Pulker et al., 2018; Kraak et al., 2019a; Renda, 2019).

However, many transnational food retailers and chain restaurants also produce and market a large proportion of highly processed, inexpensive and convenient packaged food and beverage products and menu items purchased by people in high-, middle- and low-income countries. These energy-dense and nutrient-poor products and meals contain excessive energy, fat, added sugars and sodium that contribute to poor-quality diets, linked to undernutrition, obesity and diet-related non-communicable diseases (Baker and Friel, 2016; Kraak et al., 2019a; Monteiro et al., 2013; Popkin et al., 2020; Vandevijvere et al., 2019).

Consumers choose online food shopping and restaurant delivery services for various reasons. In the United States of America, people report using online food-delivery (OFD) services because "they do not feel like cooking at home" or to "save time from cooking or cleaning" (Shoup, 2019). Malaysian shoppers are more likely to use online restaurant services, motivated by convenience, saving time, competitive pricing, pleasure and prior online purchasing experiences (Yeow et al., 2017). In Viet Nam, women are more likely to use the internet to search for food products; their purchases are motivated by convenience and price (Kim Dang et al., 2018). Research has shown that online grocery shopping could increase unhealthy choices because customers purchase primarily processed foods and are less willing to purchase fresh produce online (Jilcott Pitts et al., 2018).

This paper examines digital technology trends that are influencing the current and future business practices of the food retail landscape, including transnational grocery stores and chain restaurants. It describes trends in online food sales and meal delivery, and presents ethical concerns related to the use of digital technology in the food retail sector. It concludes with examples of how food-system stakeholders are using digital technology to support healthy and sustainable diets, providing some insights into how the COVID-19 pandemic has transformed the food retail sector.

DIGITAL TECHNOLOGY TRENDS IN THE FOOD RETAIL SECTOR

Digital technologies influence every sector of national and global economies, including agriculture (for example, precision agriculture, drones and blockchain tracing); food and beverage manufacturing (robotics); food retail and restaurants (e-commerce); finance (e-payments); and media and entertainment (social networks) (Sachs et al., 2019). Digital technologies are transforming the in-store, restaurant and online food and beverage retail environments in most high-income countries by giving customers the choice of

ordering and acquiring foods and meals in new ways based on their preferences, income and time constraints (FMI and Kurt Salmon, 2017). People can purchase groceries at traditional bricks-and-mortar stores, order and eat on the premises of a chain or independent restaurant, purchase and consume their meals in micro food halls that provide communal dining spaces, eat what they cook in test kitchens that offer nutrition and cooking classes, or collect their orders at drive-through locations. Customers can also order groceries, meal kits, take-out or takeaway meals online that are delivered to their home or office by third-party OFD companies (FMI and Kurt Salmon, 2017) or self-driving autonomous vehicles (Digital Commerce 360, 2019).

In many high- and middle-income countries (such as Australia, Canada, China, Germany, Hong Kong, India, the United Kingdom and United States), transnational chain restaurants and food retailers have digitalized the ordering and payment process to bridge the in-store and online transaction experience (Begley et al., 2020; Deloitte, 2017; Episerver, 2019). Digital technologies provide an intuitive, easy, cashless and efficient e-commerce process, whereby customers can use self-order kiosks and digital touchscreens to place orders for groceries or meals (Barrett, 2019; Episerver, 2019). These systems use biometric data collected by facial- or voice-recognition software to confirm a customer's identity, to store information about preferred payment methods and previous orders and to allow automatic purchases to be deducted from a credit card stored on the customer's mobile device (Barrett, 2019; Episerver, 2019; Hawkins, 2017; Yaffe-Bellany, 2019).

Transnational chain restaurants (such as McDonald's, Subway and KFC) and leading global retailers (such as Amazon, Costco and Walmart) engage in OFD and e-commerce. Restaurants are using digital technologies including personal computers, digital and mobile-phone applications (apps), 4G and 5G wireless networks, and online security systems to improve their efficiency and connect with customers (DiPietro, 2017). Restaurant chains are also using artificial intelligence (AI)-enabled systems, including personal digital assistants (such as Apple's Siri and Amazon's Alexa), which employ algorithmic nudging to automate, predict and personalize customer choices based on age, gender, mood, order history, time of day, weather and popular items sold (Barrett, 2019; Episerver, 2019; Hawkins, 2017; McKinsey & Company, 2019; Yaffe-Bellany, 2019).

Retailers are using the online experience to optimize search terms and website content, provide attractive images, offer promotional coupons that ensure the availability and speedy delivery of products to shoppers (Askew, 2018). An AI-enabled payment platform provides a "unified shopping experience" for customers. Retailers and restaurants in China are supported by technology firms, such as Alibaba, which has invested in facial-recognition start-up companies that scan customers' faces when making purchases. This information is linked to a government and corporate digital surveillance system used to monitor the computer activities, behaviours and data content of Chinese citizens (Wong, 2018).

Trends in online food sales and meal delivery services

During the 1990s, major grocery chains, including Walmart and Kroger, began to transform the design and service of their supermarkets for the future (Begley et al., 2020). In 2019, the online grocery market in the United States generated sales of USD–28.7 billion and sales are forecast to reach nearly USD–60 billion by 2023 (Conway, 2020). Table 1 shows global trends. Transnational retailers that have expanded into online grocery shopping include AmazonFresh, FreshDirect, Instacart, NetGrocer, Safeway and Walmart (Conway, 2020). Many leading retailers, such as Albertsons, Kroger, Target and Walmart, are using less costly strategies to compete with Amazon, including automated grocery-picking robotics, e-commerce loyalty programmes that send tailored coupons and promotions to customers, cashier-less stores, voice-enabled and personal shopping, and same-day online grocery shopping with in-store pick-up or OFD services (Begley et al., 2020; Deloitte, 2019).

A 2019 evaluation of the e-commerce marketing strategies used by six US food retailers (Amazon Prime Now, FreshDirect, Peapod, Safeway, Target and Walmart Grocery) found that a substantial percentage of online promotions (29–72 percent), email promotions (63–100 percent) and online product searches by Americans (47–73 percent) were for highly processed, energy-dense and nutrient-poor food and beverage products. The quality of fresh produce ordered online varied substantially from retailer to retailer (McCarthy et al., 2020).

Table 1. TOP 10 GLOBAL CONSUMER GOODS AND FOOD RETAIL CHAINS BY IN-STORE AND ONLINE NET SALES,[1] 2019 (USD BILLION)

Rank	Company	Headquarters	2019 in-store net sales	2024 estimated in-store net sales	2019 online net sales	2024 estimated online net sales
1	Walmart	US	503	568	49	101
2	Costco	US	151	120	7	168
3	7-Eleven	US/Japan	120	168	–	–
4	Kroger	US	119	135	–	9
5	Lidl Kaufland	Germany	117	145	–	3
6	Aldi	Germany	108	135	–	–
7	Carrefour	France	106	124	–	6
8	Aeon	Japan	82	110	–	–
9	Tesco	UK	82	89	4	6
10	Target	US	71	79	7	18

Source: *Canadian Grocer (2019); dash indicates figure is unavailable.*

In 2015, about 8 percent of American consumers reported ordering a meal or ingredient kit online; this had increased to 18 percent by 2017 (Acosta and Technomic, 2018). In 2019, an estimated 38 million Americans used smartphone apps for OFD services and this trend is projected to increase to 70 percent, or 60 million Americans, by 2023-2024, corresponding to USD 100 billion in revenues (eMarketer, 2019; FMI and Nielsen, 2018). Restaurant OFD options are popular because they offer visible, prepared menu items through mobile apps, a choice of delivery or pick-up, real-time delivery tracking and geolocation notifications for customers (Singh, 2019).

Restaurant and grocery delivery-app services are available to customers in many countries. DoorDash operates in more than 300 cities in Canada and the US; Grubhub partners with more than 30 000 restaurants in more than 1 000 American cities, while Uber Eats operates in more than 1 000 cities worldwide in countries including Brazil, India, Japan and the US. The companies take a percentage of the total price of the food and add a delivery fee to pay drivers (Carson, 2019; Singh, 2019). Postmates operates in more than 90 US cities; Zomato operates in Australia, India and the US; and Deliveroo operates in more than 200 cities across Europe (Singh, 2019). Couriers who deliver groceries or meals to customers in cities rely on tips to top up low rates of pay and are often subject to limited or no work-related benefits and unsafe conditions when making deliveries on scooters, bicycles and motorbikes (de Greef, 2019; Newman, 2019).

Digital transformation of the chain-restaurant sector

Household budget surveys can be a helpful tool for estimating expenditure on food away from home (FAFH), which has increased in many countries. For example, the average Peruvian household has spent over a quarter of its food budget to purchase FAFH since 2010 (Farfán, Genoni and Vakis, 2017). In Brazil, in 2017–2018, FAFH expenditure in urban areas was 33.9 percent of total food spending (IBGE, 2019). In China, demand for chain-restaurant meals increased from USD 10.5 million to USD 94.2 million between 1999 and 2013 (Wang et al., 2016). In the United States, consumer FAFH spending at retailers and chain restaurants combined accounted for an annual average 44 percent of total food expenditure from the 1980s, rising to 50.2 percent in 2010 (Saksena et al., 2018). In the United States, since 2010, FAFH expenditures have outstripped spending on food at home. In 2017, FAFH spending totalled an estimated USD 869.3 billion, while food-at-home expenditure totalled USD 747.0 billion (Elitzak and Okrent, 2018).

1 Revenue is the income a company generates before any expenses are subtracted. Net sales are the proceeds a company generates from selling goods or services to its customers minus returns, sales allowances and discounts.

FAFH expenditures at transnational chain restaurants have also increased over the past four decades. The 2015 Nielsen Global Out-of-Home Dining Survey explored the self-reported eating-out preferences and behaviours of more than 30 000 online respondents in 61 countries (Nielsen, 2016). In a weighted representative sample of online consumers, nearly half (48 percent) reported eating weekly at restaurants or other FAFH locations. Between 14 and 26 percent of respondents in Asia and the Pacific region (Hong Kong, Malaysia, Thailand, Viet Nam and India) said they ate out daily. Some of the reasons cited for eating at restaurants were the reasonably priced food, food quality, service and type of cuisine (Nielsen, 2016).

The top eight global restaurant chains operate in 75-140 countries worldwide, with brand values ranging from USD 7 billion (Burger King) to USD 130 billion (McDonald's) in 2019 (Kraak et al., 2019a; Locke, 2020). IBISWorld (2020) estimates the global fast food industry to be worth USD 860 billion. Most transnational chain restaurants, and the food and beverage manufacturers with which they partner for supplies, supply large portions of energy-dense and nutrient-poor menu items that exceed recommended nutrient targets for energy, fat, added sugars and sodium that undermine healthy diets (Kraak et al., 2019; Kraak, Rincón-Gallardo Patiño and Sacks, 2019). McDonald's Corporation, which leads the quick-service restaurant-chain sector, serves about 68 million customers daily in more than 100 countries. Customers often place and collect their orders at the restaurants' 'drive-thru' windows (Barrett, 2019). In 2019, McDonald's purchased Dynamic Yield, a start-up company that uses algorithmically driven decision technology to predict customer orders. Transnational chain restaurants (such as McDonald's, KFC, Pizza Hut and Domino's Pizza) may provide OFD services directly or partner with third-party companies that earn a commission for delivering meals to customers who order remotely through mobile food-delivery applications (apps) or online (eMarketer, 2019).

In 2019, more than a quarter (26 percent) of 4 500 global consumers surveyed online said they shopped online for restaurant delivery every week (Episerver, 2019). OFD restaurant sales are projected to grow 20 percent globally, from USD 35 billion in 2018 to USD 65 billion, by 2030 (Shoup, 2018; UBS, 2018). Grubhub and Uber Eats are the world's largest food-delivery services (Carson, 2019). In 2019, Uber Eats delivered an estimated USD 10 billion dollars of food worldwide (Carson, 2019). In 2019, DoorDash (27.6 percent), Grubhub (26.7 percent), Uber Eats (25.2 percent) and Postmates (12.1 percent) commanded the highest shares of US consumer spending on OFD services through delivery apps (eMarketer, 2019).

Ethical issues related to the used of digital technology in the food retail sector

With the growth in e-commerce transactions, ethical concerns have been increasingly raised about how current and future digital technologies may infringe on people's privacy and data ownership (Kwet, 2019). Digital technologies may also exacerbate bias and inequities by concentrating power and corporate control of food systems in the hands of a few digital tech and transnational actors (Russo, 2018). Moving to a cashless society has benefits and challenges. It may be convenient for shoppers, but it also exposes personal information to data breaches. It further requires shoppers to have an online bank account or credit card – and, thus, a job – to receive direct salary or wage deposits and to operate effectively in a cashless society (Pritchard, 2020).

Using biometric data to identify or confirm human features or a person's identity may save time and increase security when making online purchases (Hawkins, 2017). However, these systems may not be entirely accurate; hackers can change or steal identities and such systems allow governments to undertake the digital surveillance of populations (Unver, 2018). Citizens may be unaware of the extent to which private corporations track, collect and sell their personal data online when they use personal computers and mobile devices (Kwet, 2019). Algorithmic nudging is used to predict and influence their online choices (Episerver, 2019).

Consumers may also not realize that retailers use bluetooth technology 'beacons' or electronic devices that communicate with the apps on shoppers' mobile phones. These beacons, placed strategically throughout grocery stores, convey information to companies about the amount of time shoppers spend at different products in grocery aisles. Retailers also use 'geofencing' based on global positioning software or radio frequency identification. Geofencing allows companies to send messages to shoppers when smartphones are near or inside stores in a defined geographic area (Kwet, 2019). Geofencing and beacons are location-based digital marketing tools that help companies monitor and understand consumers' online and offline purchasing habits. These technologies require governments to develop comprehensive policies to ensure that consumers' privacy and personal data are protected (Kwet, 2019).

HOW COULD ONLINE FOOD RETAIL SECTOR BETTER SUPPORT HEALTHY AND SUSTAINABLE DIETS?

Food-system stakeholders are using digital technologies in many ways to promote healthy diets and sustainable agrifood systems (GeSI and Deloitte, 2019; Jouanjean, 2019; Renda, 2019; The Food and Land Use Coalition, 2019; Torero, 2020; World Bank, 2019). Food manufacturers and retailers are partnering with farmers who operate "smart farms" that use precision agriculture and technology-enhanced automated devices, linked through integrated systems, to improve the efficient use of soil, water, fertilizers and pesticides. Blockchain technology is being used to enhance food traceability and safe food supply.

In high-income countries, research has shown that online food shopping has the potential to encourage healthy choices, reduce unhealthy impulse purchases by using effective nutrition-labelling strategies and overcome the food constraints faced by people with limited access to stores (Jilcott Pitts et al., 2018). Food manufacturers and retailers are also using AI-enabled devices and the industrial Internet of Things (IoT) to improve efficiency, service operation and supply-chain management (McKinsey & Company, 2019). Cloud technology and the IoT are being used to optimize energy-efficient frozen foods and reduce food loss in the supply chain (GeSI and Deloitte, 2019).

Restaurants are using digital devices to monitor the quality and duration of handwashing by employees (15-30 seconds), using visible-light fluorescence spectroscopy to scan employees' hands for bacteria and viruses, offering virtual assistance from health professionals to provide online support for food-safety and public health questions, and to apply best-practice guidelines to re-open businesses affected by the COVID-19 pandemic (Becker et al., 2020; Fantozzi, 2020; National Restaurant Association, 2020; US FDA, 2020). Government agencies, such as the United States Department of Agriculture (2020), are partnering with Amazon and Walmart to enable low-income customers to use their electronic Supplemental Nutrition Assistance Program (SNAP)[2] benefits to purchase groceries online in a way that will also cover OFD service costs.

2 SNAP provides nutrition benefits to supplement the food budget of needy families so they can purchase healthy food and move towards self-sufficiency: https://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program.

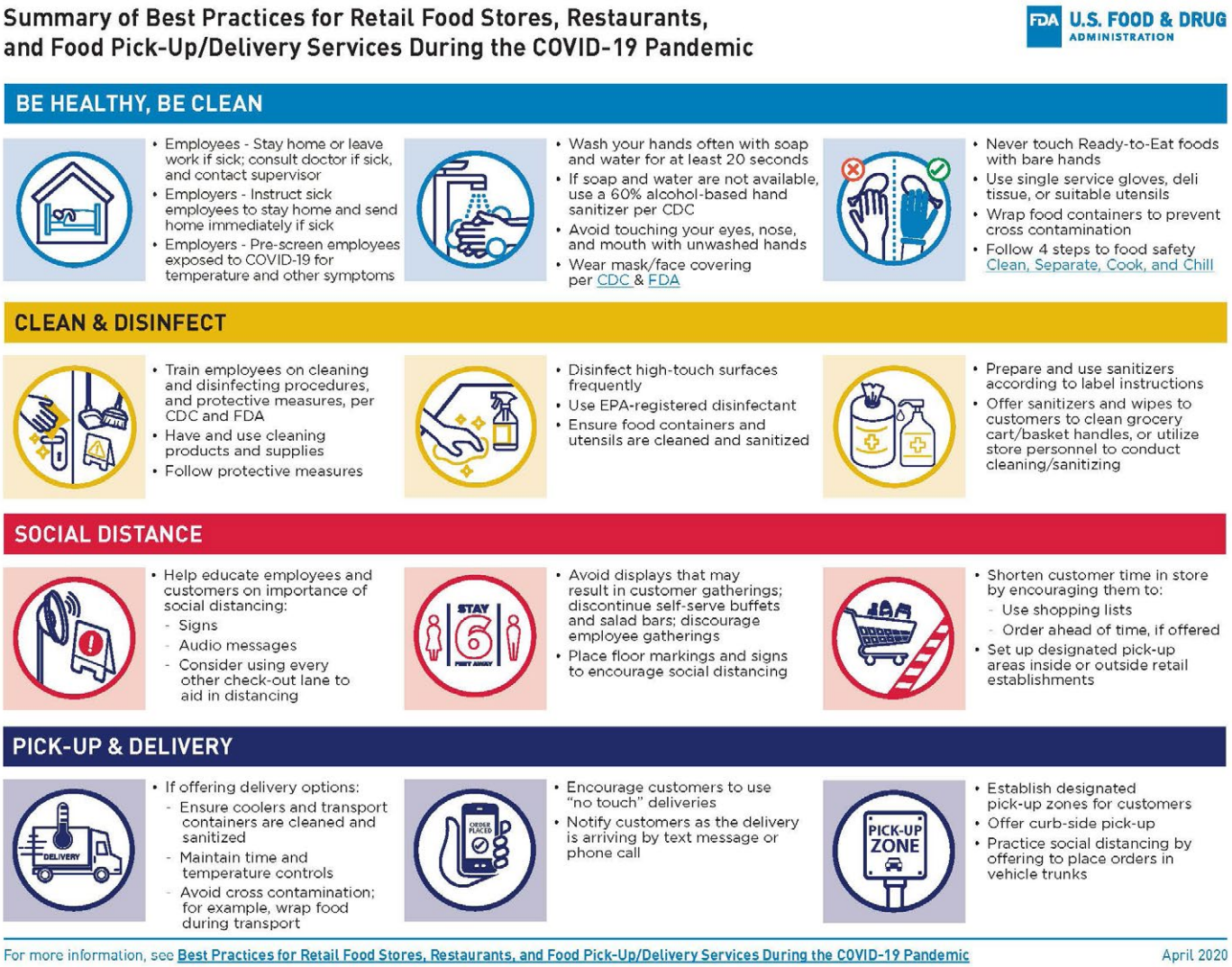
Impact of COVID-19 on the food retail and restaurant sectors

The COVID-19 pandemic is expected to prompt a significant increase in online shopping at major food retail and restaurant businesses due to concerns about crowds in populated cities, government-enforced restaurant closures and limited access to foods in rural and remote locations (Forgrieve, 2020). Market research has described several changes in consumers' food retail behaviour in the first few months of the crisis, including an increase in home food preparation and the use of OFD services (Lahouasnia et al., 2020).

The food retail sector has responded to COVID-19 by limiting human contact between frontline employees and customers, promoting hygiene, encouraging self-checkout counters and using cashless e-commerce (Kuijpers et al., 2020). The crisis has also transformed the restaurant business model within a very short space of time, with thousands of restaurant workers losing their jobs due to forced business closures. Due to the practice of "social distancing" to reduce the spread of the virus, many restaurant chains have changed their practices. Such changes include accepting only drive-through orders and collections or pickups, expanding contact-free delivery services, providing packaged meal-kit deliveries and adopting cashless systems that require e-commerce or smartphone payments. COVID-19 has also affected third-party companies that deliver groceries and meals. Uber (the parent company of Uber Eats), has seen a decline in transportation services, but a rise in its OFD business globally (Isaac and Conger, 2020).

While COVID-19 has shown the potential of digital technologies to protect people's capacity to acquire food, the pandemic has also provided transnational food manufacturers with opportunities to market highly processed, salty and sweet snack products through direct-to-consumer websites that allow e-commerce transactions (Hyslop, 2020). These products do not align with a healthy diet and undermine companies' existing marketing pledges to children and adolescents (Kraak, Rincón-Gallardo Patiño and Sacks, 2019). There is currently limited government regulatory oversight requiring food manufacturers, retailers and restaurants to encourage healthy food products and meals by default to online shoppers. Figure 1 shows best-practice guidelines to assist food retailers, restaurants and OFD businesses in re-opening using established hygiene and food-safety protocols to reduce COVID-19 transmission (Becker et al., 2020; US Food and Drug Administration; National Restaurant Association, 2020). It remains to be seen how the food retail, restaurant and OFD businesses will recover to serve customers profitably in the future.

Figure 1. BEST PRACTICES FOR FOOD RETAILERS, RESTAURANTS AND OFD SERVICES DURING THE COVID-19 PANDEMIC



Source: *US FDA (2020)*

CONCLUSION

Digital technologies influence every sector of the global and national economies, including agriculture, food and beverage manufacturing, food retail and restaurants, finance, media and entertainment. Digital technology is transforming how transnational food retailers and chain restaurants use e-commerce strategies and OFD services to reach customers. Digital technologies are a tool that food-system stakeholders could use more effectively of to address malnutrition in all its forms and to promote healthy diets that align with the 2030 Agenda. To this end, governments must develop strong policies to regulate unhealthy online food-marketing and food retail practices. They must provide leadership to secure adequate resources to promote digital-literacy skills and reduce the digital divide to food-insecure populations. Lastly, governments must develop coherent policy frameworks, ensure the enforcement of regulatory measures and encourage business practices that protect citizens' privacy and data ownership within e-commerce transactions.

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