

E-commerce's fast-tracking diffusion and adaptation in developing countries

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Abstract

E-commerce is rapidly diffusing in developing regions of the world. Its share is still small even in modern retail, except in the frontrunner China, but it is developing quickly in Asia and Latin America and emerging in Africa. Patterns of diffusion over regions mirror the super-market revolution but are lagged by several decades. E-commerce firms employ strategies to “fast-track” their spread, responding to challenges of high transaction costs, heterogeneous consumers, and persisting importance of retail small and medium enterprises. Over the past 10–15 years, e-commerce firms in developing regions have fast-tracked their adaptation to these challenges by bundling services as well as partnering with retail SMEs and delivery intermediaries.

KEYWORDS

delivery intermediaries, e-commerce, SMEs, supermarkets, supply chains

JEL CLASSIFICATION

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Diffusion of e-commerce¹ has occurred quickly in Asia, Latin America, and Eastern Europe in the 2000s and even more in the 2010s, spurred at its initiation by SARS (severe acute respiratory

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syndrome) in China in 2003 and then accelerated by the COVID-19 pandemic in 2020. In Africa, e-commerce is emerging but in fits and starts. The rapidity and the geographic sequence of e-commerce's spread roughly mirror the rapid spread of supermarkets and fast-food chains just before it, "taking off" in the 1980s to 2000s. Outside of China, where the diffusion has already gone far, food e-commerce is still a small share of modern retail and the overall food market. It is thus like supermarkets in the 1990s, an emerging phenomenon, small but growing quickly, with demand and supply conditions appearing to point to its continued rise to eventual importance. In many ways, food e-commerce is a branch growing from the tree of the supermarket revolution (Lu & Reardon, 2018), as it is driven partly by the demand- and supply-side factors spurring modern retail's spread, but it is now combined with digitalization² and thus an intersection with the computer/internet/mobile phone revolution in developing regions.

Supermarkets and fast-food chains have "fast-tracked" their spread in developing regions by not just depending on traditional and inadequate supply chains, but treating their supply chain, both in procurement and marketing, as endogenous (Reardon et al., 2007; Du et al., 2016; Zilberman et al. 2019). We focus in this paper on e-commerce's diffusion and the marketing side, and show that e-commerce firms (and supermarket chains that added e-commerce operations) have used "fast-tracking" strategies similar to those used by supermarket chains. These strategies were used for the initial diffusion and market penetration. They then implemented a series of adaptation strategies to address the constraints that emerged during diffusion and deepen their market penetration.

We will show that the diffusion and adaptation patterns in e-commerce illustrate several important economic concepts: (1) E-commerce technology diffusion and transfer is moving from developed to developing regions, allowing the latter to "leap-frog" to advanced techniques, in parallel to other diffusion processes such as of the Green Revolution agricultural technologies (Feder et al., 1985). (2) Diffusion is occurring at different rates over heterogeneous regions, with early adoption in regions with better demand and supply conditions (Asia and Latin America) and with lagged adoption in Africa. (3) The innovations of e-commerce are building or layering onto recent innovations embodied in the supermarket and computer/internet/mobile phone revolutions in developing countries. (4) Innovators in technology as well as supply chain design adapt quickly to emerging opportunities and are spurred by crises. (5) Intense competition among oligopsolistic lead firms induces a cascade of competitive innovations in marketing tools to create demand and resolve constraints of consumers and create economies of scale and scope.

In this paper, we analyze with cases, trends, and categorizations, based on the little survey data available, to show diffusion and using evidence mainly from the trade press and some emerging business case studies to illustrate and support the points.

The paper proceeds as follows. We start by reviewing the evidence for the diffusion of food e-commerce and categorize the types of firms involved. We use some broad survey information from Euromonitor and then for each trend illustrate with cases from two Asian countries (China and India) leading in e-commerce, and two African countries (Nigeria and Kenya). In the analysis of diffusion, we highlight the strategies of the firms to fast-track growth, such as the formation of hybrid forms of e-commerce and brick-and-mortar supermarket chains. We then discuss e-commerce firms' adaptation strategies, in particular their bundling services and partnering with the rapidly emerging delivery intermediaries. We conclude with several policy implications and a research agenda.

FAST-TRACKING E-COMMERCE DIFFUSION

The rapid but uneven emergence of e-commerce in developing countries

E-commerce emerged in developing Asia, Latin America, and Central and Eastern Europe in the 2000s. Rees (2020) presents data showing the growth of e-commerce in these regions by the 2010s using Euromonitor data for Asia (India, Indonesia, Malaysia, Philippines, Thailand, and Vietnam), Central and Eastern Europe (Bulgaria, Hungary, Poland, Romania, Russia, and Ukraine), Latin America (Argentina, Brazil, Chile, Colombia, Mexico, and Peru), the Middle East and Africa (Egypt, Morocco, Nigeria, Saudi Arabia, South Africa, United Arab Emirates), and Turkey.

On one hand, the data show that e-commerce is still only emerging in the Euromonitor set of countries (figuring in the survey of Rees (2020) presenting data from the retail and consumer data survey firm Euromonitor), with food e-commerce at about US\$50 billion versus modern retail store sales at about US\$1.5 trillion and traditional grocers' sales at about US\$600 billion. On the other hand, food e-commerce is growing rapidly. The value and growth in e-commerce of snacks plus dairy over 2015–2020 grew from US\$7.5 billion in 2015 to US\$22 billion in 2020, with a year-on-year growth at 15% in 2015 versus 50% in 2020. These growth rates are similar to the rapid rates of growth in supermarket sales in the past two decades (for Asia, see Reardon et al., 2012; for Latin America, Popkin & Reardon, 2018).

However, poorer regions (such as in Africa) are well behind the above regions and e-commerce is barely emerging and in general growing slowly and in fits and starts. To show the contrast between leading and lagging regions in the diffusion of e-commerce, we briefly compare several countries in Asia and Africa.

Asia's e-commerce: bounding forward

Here we use the examples of two leaders in e-commerce in Asia, namely China and India. China was in the early part of the third wave of the supermarket revolution,³ as its urbanization, income increases, and liberalization came in the 1990s and 2000s. With that foundation, plus the rapid spread of mobile phones and the Internet, China was in the vanguard of the first wave of e-commerce diffusion. From 2003 to the present, e-commerce developed quickly, especially in the 2010s.

That growth is mirrored in the growth in sales of one of its lead companies, Alibaba, founded in 1999 by FDI (foreign direct investment) of Japan's Softbank and Yahoo. Alibaba started with B2B (business-to-business) in 1999 and B2C (business-to-consumer) in 2003 (right after the SARS outbreak as discussed below). Retail sales in agricultural products on Alibaba platforms were just starting by the mid-2000s but had reached about US\$7 billion in 2013 and grew fourfold to about US\$28 billion in 2019 (Alibaba Research Institute, 2014, 2020). That is about twice as fast as supermarket sales grew in Asia in the 2000s (Reardon et al., 2012). Alibaba invested elsewhere in Asia, such as with its acquisition in 2016 of the Southeast Asian multinational Lazada founded in Singapore in 2012; with that acquisition Alibaba expanded into Indonesia, Malaysia, Singapore, Vietnam, Thailand, and the Philippines (Harper, 2020). Alibaba has also invested in India.

India was in the late part of the third wave of the supermarket revolution, lagging behind China in urbanization, liberalization, and income increases. But India developed into an IT hub with a cluster of IT firms oriented to the global market and, in the 2010s, to the Indian market as well. These factors together, combined with congested cities, created a context favorable to rapid e-commerce spread in India. Pham (2020) notes that by 2020 the sales of online grocers were worth US\$3 billion, compared to a negligible amount when online grocery was starting in 2010. Food e-commerce is of course still a small part of the overall food retail market in India, estimated roughly at US\$500 billion and the US\$30 billion food sales by supermarkets in India.

Large Indian firms led the emergence of firms such as Flipkart in 2007; it was purchased by Walmart in 2016 to start its e-commerce in India. E-commerce firms from developed countries also invested in India. The leading example is Amazon's "start from scratch" entry into India in 2013. It is instructive to observe what Amazon had to do. It had to recruit suppliers to list on their site, and instituted a program called Amazon Chai Cart, which engaged with thousands of small businesses to explain the service. In 2015 it instituted Amazon Tatkal, which provides launch services for listing suppliers, such as registration, image, cataloging, and sales training. Amazon set up dozens of warehouses ("Fulfillment by Amazon") in which it stored, picked, packed, and shipped products received from suppliers. It also instituted Easy Ship and Seller Flex to pick up packages from suppliers and deliver them to consumers, obviating the warehouse stage, for a "hyper local" approach. It has contracted logistics such as with India Post, set up its own logistics division, and used bicycle and motorbike services for "last mile delivery" in rural and urban areas. Finally, Amazon enlisted local shops to be both internet connection points (to Amazon) and as fulfillment and money collection points for local customers (Govindarajan & Warren, 2016). Amazon started fresh-food deliveries in 2016 (Pham, 2020).

FDI thus played a role in consolidation via purchases such as by Alibaba and Walmart above, and by solo FDI such as by Amazon. These patterns of FDI are similar to those in the supermarket revolution over the prior three decades.

Africa's e-commerce: lagged and constrained

African e-commerce, in contrast with those in China and India, started later and has grown much less consistently, facing higher transaction costs and apparently much more limited demand. For example, Jumia is the leading e-commerce firm in Africa. It was founded in 2012 in Nigeria, with its leading stockholder being South Africa's MTN, Africa's biggest telecom company. BBC (2019) reports that Jumia's sales grew steadily through 2018. However, in the second half of 2019, its sales declined and it withdrew from around half of the dozen countries in which it had effected FDI, faced with flagging demand and high transaction costs for deliveries and procurement (Kazeem, 2020b).

Food e-commerce lags non-food e-commerce but food is catching up

E-commerce took the same path as supermarkets' penetration of food retail, moving over time from non-foods to dry foods to fresh foods, in the United States, Europe, and developing countries. Food e-commerce is still a minor share of all e-commerce. For example, food e-commerce was estimated at roughly US\$3 billion in India in 2020, a 76% increase over 2019 (The Economic Times, 2020b), but that is only 6% of the US\$50 billion Indian e-commerce market (GlobalNewswire, 2020).

Yet, food e-commerce is growing faster than the supermarket sector and non-food e-commerce, so the share is projected to increase and continue to grow. In a decade it will be a major form of retail. The situation in China in the 2010s could be a harbinger for other developing countries in food e-commerce (just as Brazil was for supermarkets in the 1990s). As we note below in the discussion on drivers, e-commerce is “leap-frogging” brick-and-mortar modern retail growth in China. Using data from Edge by Ascential (formerly PlanetRetail), van Ewijk et al. (2020) estimated that e-commerce already constituted 32.5% of modern food grocery retail by 2018, up from 1.4% in 2010. The share of food e-commerce in modern retail in China is four times its share in 2018 in France, Germany, and the United States.

Two revolutions, those of supermarkets and computers, swept through many developing countries in the 1980s through 2010s. Those two revolutions set the stage for the emergence of e-commerce as a “vectorial combination” of them.

E-commerce diffusion “pulled” by the supermarket revolution

First, the supermarket revolution emerged and rapidly spread in developing regions, starting in the 1980s and 1990s, spreading much faster than it had in the United States. As it spread, it reduced the share of traditional retail, first in processed foods, then in semiprocessed foods, and recently in fresh produce. These were the same stages as in the United States (Reardon et al., 2003). Supermarkets appealed to consumers as “one stop-shops” that reduced the shopping burden on time-constrained women increasingly entering jobs outside the home, and over time reduced food prices to consumers via economies of scale (Minten & Reardon, 2008). In the United States for a long time and still in many developing countries, small shops and wetmarkets hung on using the advantage of proximity. Supermarkets gradually reduced that advantage by adding small formats and being peppered over space, adding home delivery decades ago. But it was not until e-commerce's emergence in the United States in the 1990s and developing regions thereafter that modern retail addressed the full range of opportunity costs of shopping time, especially in urban areas (Lu & Reardon, 2018).

Second, limited real estate and consumer travel time limitations constrained the expansion of modern “brick-and-mortar” retail and appear to have spurred e-commerce to “leapfrog” the diffusion of “brick-and-mortar” modern retail such as supermarkets in China (Van Ewijk et al., 2020). This encouraged existing retailers and new ecommerce firms (both domestic and foreign) to invest in e-commerce, which we discuss further below when treating the inverse, namely e-commerce investing in brick-and-mortar supermarket chains. The technology was transferred “embodied” in FDI by retail, wholesale, and logistics multinationals using e-procurement and themselves starting or buying e-commerce firms.

Third, the same government policies and investments that played key roles in enabling the supermarket revolution also helped the rise of e-commerce in developing regions, in addition to the liberalization of FDI in retail (Reardon et al., 2003) which later also opened the door to FDI by Alibaba, Amazon, Walmart, Jumia, and others in e-commerce.

E-commerce diffusion “pulled” by the computer/Internet/mobile phone revolution

From the 1950s to the 1990s, there were a series of well-known technological innovations collectively known as the “computer revolution” with the invention and wide diffusion of main-frame and mini-computers, software, and the Internet, extending into laptops and mobile

phones. The computer revolution created the digitalization technology “on the shelf”, which was incorporated into retail in several stages.

First, from the 1970s on, digitalization was incorporated into processes internal to firms, including accounting, billing, inventory control, consumer transaction scanning, quality control, and eventually payment tracking. Digitalization internal to the firm extended to relations with suppliers and clients for billing. An example of its use for internal processes is the company SAP (Systems, Applications, and Products in Data Processing) in Germany in 1975. An example of its use for supply-chain inventory management is Nestlé’s GLOBE system started in 2000 (Mitra, 2012).

Second, from the 1990s on, global retailers began to establish e-platforms for B2B e-procurement, thus digitalizing part of their supply chains (Reardon et al., 2005). This started as the use of electronic data exchange (EDI) in particular between large chains such as Walmart and their major suppliers in various regions, particularly for non-foods and processed foods. The EDI system of Walmart allowed it to send out orders, verify the receipt of orders by suppliers, schedule delivery, and provide data on sales to enable suppliers to manage inventory.

B2B’s next step was internet exchanges used by groups of retail chains globally to reduce coordination costs and outsource logistics operations. These included internet B2B exchanges and e-procurement and logistics services. Globally, there emerged in the 1990s several main “general” internet B2B exchanges into which large retail chains made major investments during the late 1990s and early 2000s, such as the WorldWide Retail Exchange for fresh produce (Globalsources.com, 2001). Alibaba’s first online operation (and still in operation) was a B2B e-platform in China so that global firms could source from a rapidly industrializing China.

Third, mainly from the early 2000s, developing regions saw the rapid spread of the Internet and mobile phone networks as well as broad, flexible, and adaptable e-platforms which became the “soft infrastructure” of e-commerce. They spread rapidly in conjunction with the extremely rapid spread of mobile phones, computers, and social networks in Asia and Latin America and recently in Africa. The cost of setting up online shopping, as well as the diffusion of cell mobile phones and home computers important to e-commerce, was dependent on strategies of mobile network firms. Costs of going online were also conditioned by policies affecting the cost of internet and mobile phone networks in developing countries (Torero, 2019).

Two categories of firms were involved in mobile networks and broad e-platforms. The first category is those that provide mobile networks. An example is Safaricom (www.safaricom.co.ke), which started in 2000 and has 4000 mobile phone towers across Kenya, a mobile phone network, and a transactions/mobile money app, M-PESA. The second category comprises those firms providing e-platforms such as Facebook and its app Whatsapp. This software is widely used by retailers, consumers, and suppliers, and is often used as the app for e-commerce transactions and payments, in addition to others like PayPal. Facebook and competitors like Google with GooglePlay have intensively invested in developing regions. These two categories have combined at times. For example, Reliance Industries launched Jiomart (more on this below) as its e-commerce company in India in 2019. Jiomart uses Reliance’s mobile network subsidiary Jio, and Facebook and Google bought stakes in Jiomart in 2020 (Bhalla, 2020b; Pham, 2020; The Economic Times, 2020a).

The diffusion of mobile networks and digital platforms was fomented by active marketing of the software and the Internet by companies that had developed the technologies, the software capacity, and the markets in developed countries. Both large international companies and local software companies provided “turnkey” solutions to firms to add digitalization to their marketing and supply chains. They went then to developing regions as the demand conditions, discussed above, developed.

But also crucial was the spread of skilled, professional labor in software and computers. This sometimes occurred as a complementary development to the development of the local IT sector and infrastructure, which supported mobile platforms developed by foreign and domestic retailers, as in India (Jalote & Natarajan, 2019).

Retail e-commerce was an extension of the above digitalization waves, born from Amazon selling books online starting in 1994 (when Amazon was an SME, an innovative startup), Alibaba starting e-commerce 10 years later in China, and, in between those years and beyond, the entry of many other competitors. E-commerce spread first into Asia and Latin America and then into Africa. It went from non-foods to processed foods to fresh foods. In these steps, its path was similar to the path of supermarket diffusion.

E-commerce diffusion accelerated by disease

Similar to in the supermarket revolution, consumer fears related to hygiene and food safety encouraged e-commerce. For example, in April 2003, SARS started in China and spread via close contact, coughs, sneezes, and close conversation (<https://www.cdc.gov/sars>). Consumers avoided close contact by avoiding public places including shops and wetmarkets. Yang and Wang (2013) note that Alibaba's e-commerce (taobao.com) was started in May 2003 with SARS as an important inducement.

Moreover, while e-commerce was already growing quickly before COVID in Asia and Latin America and other emerging markets, SARS-CoV-2 (COVID-19) accelerated its growth. Vardhan (2020) presents Euromonitor survey data showing e-commerce upticks in yearly growth rates in various countries (Table 1).

Chinese e-commerce was accelerated by COVID-19 (Chou and So, 2020). Online grocery shopping orders in general increased 400% compared with those in the first trimester in 2019 (Meituan Research Institute, 2020). Yonghui Online reported an increase of 600% compared with sales in the same period in 2019. During the last week of January, MissFresh (Mei Ri You Xian) reported a 465% increase in sales, compared to the same period in the previous year (Li, 2020). By June, MissFresh reported delivering 1 million orders of fresh grocery in Beijing per day (Sina News, 2020).

Indian e-commerce was also accelerated by COVID-19. For example, the food e-commerce firm BigBasket reported a 500% surge in March and April, as did their rival GROFERS, providing service to a million homes in 3 weeks (Singh, 2020b).

COVID-19 reinvigorated African e-commerce, although it is not clear for how long, given the underlying transaction cost constraints noted above. Jumia had a 400% increase in sales in the first trimester of 2020 compared with 2019 (Kazeem, 2020a). It reported 30% month-on-month increase in sales from March through May, parallel with a large investment in logistics capacity (Henry, 2020).

TABLE 1 E-commerce yearly growth rates (%) in 2019 (before COVID-19) and 2020

Year	Indonesia	South Africa	Brazil	Mexico	India	Nigeria	China
2019	60	20	15	15	30	20	10
2020	120	100	100	80	70	50	20

Source: Vardhan (2020) from Euromonitor survey data.

E-commerce propelled by competition and mergers: Dueling firms and iterative imitation

As with supermarkets in the 1990s and 2000s (Reardon et al., 2007), intense competition with “iterative imitation” among innovating firms “fast-tracked” e-commerce. The competition occurred among e-commerce firms and between them and supermarket chains, with the following trends and strategies:

First, large e-commerce firms added physical (“brick-and-mortar”) supermarkets, and brick-and-mortar supermarket chains added e-commerce operations. This occurred through green-field investments, mergers and acquisition, or joint ventures. Examples in the United States are Amazon acquiring Whole Foods in 2017, and Walmart starting e-commerce as a response.

This formation of combinations was especially spurred by e-commerce evolving from mainly non-foods to groceries, and especially into fresh foods. The difference with supermarkets is that the cycle for e-commerce has been over one decade, while that for supermarkets in developing countries two or three decades and for supermarkets in the United States four decades (Reardon & Timmer, 2012).

There appear to be two reasons for the “early” (compared with supermarkets’ history) foray into fresh produce by e-commerce firms in developing countries. On the demand side, the grocery market is large, and consumers are used to shopping at small local shops and wetmarkets, and recently even in supermarkets, for fresh foods. They buy from street vendors and restaurants. For e-commerce to compete with supermarkets and with local small vendors, it had to move fast into fresh foods.

On the supply side, e-commerce tried direct marketing of fresh food, as Alibaba did in the 2000s, but faced challenges in logistics. These problems were addressed by e-commerce firms partnering with or starting or acquiring supermarket chains that support a three-pronged model of direct customer visits to maintain volume, fresh produce pickup, and delivery (discussed further in the adaptation section). For the latter, brick-and-mortar stores near consumers for pickup or local delivery are a crucial advantage, and having e-commerce is an advantage for convenience (eTail, 2019).

In China, e-commerce firms have built or acquired supermarket chains or e-commerce hub-and-spoke firms that also function as fresh-food e-commerce bases. For example, in 2015 Alibaba started the supermarket chain HeMa XianSheng (<https://www.freshhema.com>), “Hippo” in English. In 2018 Alibaba started to expand it quickly (Wu & Gereffi, 2018). Customers can either buy from the brick-and-mortar stores or use the HeMa mobile app to order fresh foods and dry groceries. HeMa enabled Alibaba to increase sales in fresh vegetables, meat, and dairy by 30% per year (Alibaba Research Institute, 2020).

In India, large supermarket chains bought or founded e-commerce operations. For example, in 2018 Walmart bought Flipkart, a large e-commerce firm started in 2007. In 2019, the large Indian retail firm Reliance (with an extensive chain of Reliance Fresh stores) started Jiomart as a grocery e-commerce. The latter is based on Reliance’s Jio platform which is linked to its mobile network Jio. Jiomart uses as fulfillment and delivery points its own Reliance Fresh stores as well as independent small shops (discussed further below).

In Nigeria, some supermarket chains added e-commerce operations. The nine-store supermarket chain FoodCo started local e-commerce in mid-2020 that had already been under development in 2019. The launch in mid-2020 was in response to the pandemic. They take orders only via their website and WhatsApp and then deliver them to consumers (Adewakun, 2020).

Second, the large e-commerce firms (including brick-and-mortar retailers that had added e-commerce) started an intense competition both in investment in their home countries and also in FDI. As with the supermarket revolution, this “fast-tracked” diffusion. The investments can be classed into what Awokuse and Reardon (2018) call the second and third (recent) globalizations. In the second globalization, “North–South”, firms from developed countries undertook horizontal (to sell to the local market) FDI in developing regions. An example of this is Amazon and Walmart investing in e-commerce in India.

In the third globalization, “South–South,” firms from developing countries undertook horizontal FDI in other developing countries, often in those in a less advanced tier in the sector in question. An example of the latter is the competition among large e-commerce firms to expand in contested markets like Southeast and South Asia. Alibaba's FDI is an example. Alibaba bought Lazada to penetrate Southeast Asia. Alibaba invested in India, in Paytm as its largest shareholder (Paytm is a payment app firm), Zomato (a major food delivery intermediary firm with an app), BigBasket (a grocery e-commerce firm), Snapdeal (an e-commerce platform), and Xpressbees (a logistics company). Alibaba's Chinese rival Tencent invested in rivals of Alibaba's in India: Swiggy (a major delivery intermediary in food service, the main rival to Zomato), as well as Flipkart, majority owned by Walmart (Li, 2019).

Entrance of e-commerce SMEs that compete with large firms

A number of e-commerce small and medium enterprises (SMEs) started competing with the large firms mostly in dry groceries, fresh produce, and prepared foods. SMEs are of several types.

First, there are SMEs that focus on e-commerce, thrive, and then attract investments from retailers, e-commerce firms, and venture capital funds. Some of these graduate to become “unicorns” (billion dollar firms). Examples from India are BigBasket and Grofers. BigBasket started in 2012 and grew rapidly as a fresh-foods e-commerce company. It obtained funding from Alibaba and various sources of venture capital (Singh, 2020b). Grofers (from grocery gophers) started in 2013; it raised capital from the Japanese firm SoftBank (www.grofers.com).

Second, there are SMEs that seek niches either in markets (such as Africa) where there are few large incumbents yet, or product-specific markets in other regions. For example, in Nigeria Agromint has a small and diversified operation: (1) selling various inputs (seeds, seedlings, saplings, fertilizers, agrochemicals, day-old chicks) and equipment to farmers; (2) buying fresh produce and live broiler chickens from farmers to retail online to consumers and processors; and (3) buying processed foods from processors to sell to consumers. Suppliers list on Agromint's site on Whatsapp and Facebook. Agromint handles the transaction and the delivery to the buyer. Deliveries are made by courier services, local transport, and office pickup (www.agromint.com; www.facebook.com/pg/agromintltd/photos/). Agromint was growing, with a staff of seven before COVID (Interview with Agromint by authors, July 10, 2020).

Another example from Nigeria is an SME food service firm that puts up its menu on an e-platform and delivers prepared foods to consumers. Anikys Sauces in Lagos started in 2020 just before COVID-19. They put their menu on Whatsapp, and with increased demand during COVID-19, they added Instagram and Facebook,⁴ and as they increased scale, shifted from own delivery to use of third-party logistics (3PLS). (Personal communication from Anikys Sauces in authors' interview July 2020).

Third, there are small chains (such as Nigeria's FoodCo noted above) and independent supermarkets and even small grocery stores that set up an e-commerce division to effect home delivery (by them or more commonly by a third party) plus an e-platform like Facebook or GooglePlay. These became more common during COVID-19 in 2020.

FAST-TRACKING E-COMMERCE ADAPTATION

Two key adaptation strategies used by large e-commerce firms in developing regions have been bundling of services for consumers to adapt to their payment and transaction cost constraints, and partnering with and serving their competition, the retail SMEs, the dominant actors in developing country retail, especially in poorer regions like South Asia. We treat these two below.

E-commerce bundling services to compete for consumers

Large e-commerce firms compete intensely. A key strategy they use is “bundling” complementary services to address constraints facing consumers and making their offer more attractive (Simonin & Ruth, 1995). As one firm innovates with a new element added to the bundle, the leading competitors emulate that innovation and then introduce yet another innovation. The rounds of innovations in bundling drive forward the overall attractiveness of e-commerce to consumers and “ratchet up” the set of bundled services in the market. That expands the markets of the leaders but also spills over via emulation by second- and third-tier firms. These bundled services solved the problems facing consumers (just as resource provision contracts solved idiosyncratic market failures of suppliers used by supermarkets to adapt to their challenging market environments and fast-track growth, Reardon et al., 2007).

This competitive bundling was seen in the supermarket revolution in developing regions: a leading chain would introduce consumer loyalty cards, then in waves the others would follow suite, and add delivery, then credit, then money-back guarantees, and so on (for India, see Reardon & Minten, 2011). This same behavior is now common in e-commerce; we illustrate it below.

First, large firms introduced finance platforms for secure online payments for both suppliers and consumers for financial transactions. This was a crucial step for e-commerce to spread in food economies, which often were mainly cash-based, with little use of credit cards (except in the emerging supermarket sector), although in the 2010s mobile payment was emerging with the spread of mobile phones. These services were sometimes already a division of the company. For example, the third-party mobile and online payment platform Alipay was founded within Alibaba (<https://intl.alipay.com>) in 2004. Reliance started JioPay and JioMoney initially for its mobile network business and then extended them to its e-commerce arm Jiomart in 2019.

Sometimes an e-payment company was bought or partnered with by e-commerce and/or delivery intermediaries. For example, Paytm was founded as an Indian company in 2010 (<https://paytm.com/>) as a mobile payment platform. In the past several years, it has formed joint ventures with Alibaba in 2015 (for a 40% stake) and Tata Starbucks (the latter in July 2020 during COVID-19) for e-commerce support, Citibank for credit cards, and the Japanese Softbank. In turn, Paytm acquired companies that allowed it to adapt to the local context, such as the Indian language texting company Plustxt, bought in 2013. Paytm also started Paytm Mall in

2017 as its own e-commerce business; it provided e-commerce to supermarket chains such as Big Bazaar (Leo, 2019).

Second, both e-commerce firms and supermarket chains adding home delivery after an internet transaction is highly dependent on logistics. Alibaba and other e-commerce firms in other developing countries initially struggled with piecing together, in fragmented logistics markets, sufficient 3PLS. Large companies started their own logistics affiliates. Alibaba started Cainiao in a consortium in 2013 and then acquired majority stake in it in 2017. Paul (2019) notes that this is part of a trend by large e-commerce firms to bring logistics inhouse to gain more control, as with Amazon in the United States and JD.com in China.

Paul (2019) notes that e-commerce firms' own logistics competed with incumbents like Fedex and UPS. In the United States, the trend is for those incumbent firms partnering with shipping e-platforms like Shippo. Shippo (<https://goshippo.com/>) is a software company that links e-commerce firms with logistics carriers. We find that a similar trend is occurring in developing regions where logistics firms partner (or become) "delivery intermediaries" working with smaller e-commerce firms or brick-and-mortar retailers or food service firms. We discuss those intermediaries below as a specific segment.

Large e-commerce firms serving and partnering with SME retailers

Perhaps surprising at first glance, large e-commerce firms (and supermarket–e-commerce hybrids) have partnered with and served their main competitors, namely retail SMEs. We think this has been the most interesting adaptation to the market environment they face in developing countries where, outside of Latin America and East Asia, retail SMEs still hold the dominant market share. The trade press repeatedly communicates the motivations of the large firms as continuing to compete at a broad level with retail SMEs just as supermarkets have been doing; but in places like South Asia where SMEs are still very dominant, they adapt to their current dominance by finding a variety of ways to partner with them and sell them services, even though that prolongs the competitiveness of SMEs.

Historically, however, this bimodal approach to retail SMEs by large retail firms is not new in its main outline. Large chain "cash-and-carry" retailers cum wholesalers such as Metro (Khanna et al., 2006), Sam's Club of Walmart, and many like them going back a hundred years, have wholesaled products and handled deliveries for small retailers even while gradually competing directly with them as the large firms' retail sides grew (see Reardon & Minten, 2011, for India examples). The difference with large e-commerce and mobile e-platform operations is that these firms have performed a broader range of services and partnering than the brick-and-mortar cash-and-carry firms did before them. We observe the following range of services.

First, small shops purchased software and hardware from large firms for digitization of inventory, advertisement, accounts, and mobile payments. For example, in India before COVID, small shops began commonly to use Facebook, Khatabooks, Paytm, PhonePe, PineLabs, and Google Play for those tasks (Bhalla, 2020a). Recall, this is like the initial stage of "digitalization of retail" in developed countries in the 1970s.

Second, e-commerce firms (and related mobile companies) sold services to SME retail and food service firms to help the latter adopt e-commerce themselves. In India, for example, Reliance served SMEs with its Jio, Jiopay, Jiomoney, and finally Jiomart. It facilitated a micro e-commerce by SME retailers with (1) Jiopay; (2) Jiomart, allowing the small shop to create a "virtual storefront"; (3) inclusion of the small shop in Jiomart's own e-commerce as a

fulfillment or pick-up point; (4) allowing the small shop to order from Reliance via Jiomart as a mobile form of a cash and carry; (5) supplying small shops with hand terminals from Jio to manage inventory. These were all started before COVID-19 but increased during the pandemic.

Third, large e-commerce firms used retail SMEs as “points of sale”, buying “fulfillment spaces” from the small stores (equivalent to buying a small “dark store” at the back of a “mom-and-pop shop”). For example, In India, Amazon started in 2013 an “I Have Space” program with small shops as delivery points for Amazon e-commerce. Amazon started an “Amazon Easy” training program for small shops to help the clients of the small shops to shop online from Amazon and get the products delivered to nearby small shops. Walmart and Flipkart started a program in 2019 similar to Jiomart and Amazon with storage and delivery by small shops using Shadowfax (started in 2017) as the delivery intermediary (Pham, 2020; Singh, 2020).

Fourth, SME wholesale firms vertically integrated (or shifted to) to become SME retail firms partnering with e-commerce. For example, product-category e-commerce SMEs emerged in the 2000s and 2010s and received a fillip from the 2020 pandemic. In Malaysia, MyFishman.com, a “brick-and-mortar” fresh seafood subscription and delivery service, started in 2016; in 2020 it partnered with Lazada (a regional e-commerce firm acquired by Alibaba) to put its wholesale and retail business on the Lazada e-commerce platform. This was induced by COVID-19-related difficulties of selling directly to SME retailers and consumers (www.myfishman.com; Harper, 2020).

E-commerce partnering with “delivery intermediaries” to overcome transaction costs

“Delivery intermediaries” have been crucial in the diffusion of e-commerce by supermarket chains, small retail stores, and small restaurants (food service), and have worked in various countries as components of the delivery systems of large e-commerce firms. They offer a range of services from intermediation itself (representing the retailer to the consumer) to assembling the functional elements of the transaction (communication, payment, logistics, sometimes credit and advertising and value-added such as packing). These services are thus outsourced by the retailer to the delivery intermediary. The delivery intermediary provides an app that handles an order from a customer to a client store (a supermarket or a small shop), restaurant, or an e-commerce distribution center, and the delivery intermediary processes the payment and arranges delivery. The payment function may rely on partnering with an e-payment firm; the delivery may rely on partnering with a logistics firm such as Uber or DHL. There are several categories of delivery intermediaries.

First, a delivery intermediary may represent the consumer and source from a number of subscribed retailers; examples are Instacart (started in 2012) in the United States, or Cornershop founded in 2015 in Chile, then expanded to Mexico (Lynley, 2017) and by 2020 also to Brazil, Canada, Colombia, Costa Rica, Peru, and the United States (www.cornershopapp.com). These firms developed rapidly in the 2010s as supermarket chains added e-commerce to compete with the rising e-commerce firms.

Second, delivery intermediaries working with individual client SME retailers and food service firms arose in the 2000s and rapidly developed (with a major fillip provided by COVID-19). The cases of several leading firms illustrate this.

In China, Meituan (www.meituan.com) is the leading delivery intermediary, founded in 2010. It started by offering group-buying discounts for online users (like Groupon in the United

States, started in 2008) and later included consumer reviews of restaurants (like Yelp in the United States, started in 2004). Meituan started its food delivery platform in 2013. Meituan does millions of deliveries each day on its large fleet of e-bikes. Meituan, among other leading Chinese delivery intermediaries including Ele.me (www.ele.me) and Jing Dong Dao Jia (www.jddj.com and InsideRetailAsia.com, 2017) dominate the delivery intermediary sector that arose recently and have grown quickly from SMEs into large firms. They are now fully or partly owned by the leaders in internet and e-commerce in China, namely Alibaba, Tencent, Baidu (China's equivalent of Google; it recently sold its delivery business to ele.me), and JD.com. Thus, the battle among the delivery intermediaries is a kind of “proxy war.” The stakes are high: iiMedia, a research firm in China, estimates that about 355 million Chinese (a quarter of the population) order food from their phones, with a rapid shift from call-in orders to these e-platforms over about 15 years (Liao, 2019).

In India, similar firms are developing quickly. An example from India is Swiggy (www.swiggy.com), the leading food ordering and delivery platform started in 2014 with its app launched in 2015. It is similar to Meituan in its operations and strategies. Swiggy's growth was accelerated by COVID-19 after an initial loss during strict lockdown. As expectations of a recovery formed in India in mid-2020, Swiggy started a “jumpstart” package for its 40,000 restaurant partners. It also provides the Swiggy Capital Assist Program for loans to SMEs struggling to restart and provides them safety and hygiene training and sells them packaging and cleaning kits. It uploads pictures of its client restaurants' safety practices to draw back customers (Indiaretail.com, 2020).

Finally, logistics firms such as ride share firms (e.g., Uber, or Bykea in Pakistan) and product delivery firms (such as DHL and its national counterparts in various countries) have invested and adapted to delivering food, and work with delivery intermediaries either as partners or through acquisitions.

CONCLUSIONS: POLICY IMPLICATIONS AND RESEARCH AGENDA

In this paper, we showed that e-commerce firms, large and small, and hybrids mixing supermarkets and e-commerce operations, have emerged and are rapidly diffusing in developing regions. Their share is still small in total food retail and even in modern retail, except in the frontrunner China, but is developing quickly especially in Asia (and Latin America, not treated here). They lag in Africa. These patterns of emergence and growth, and their differentiation over regions, mirror the supermarket revolution but lagged by several decades. These patterns illustrate the economic concepts that technology diffusion and transfer is moving from developed to developing regions, allowing the latter to “leap-frog” to advanced techniques. Within developing regions, diffusion is occurring at different rates over heterogeneous regions, with earlier adoption in regions with better demand and supply conditions.

We found that e-commerce firms employ a range of strategies to “fast-track” their diffusion. And after being challenged by issues of transaction costs that are general as well as specific to heterogeneous consumers and challenged to interact with the still-dominant retail and food service SMEs, e-commerce firms fast-tracked adaptation to these challenges by bundling services, partnering with and upgrading retail SMEs, and partnering with delivery intermediaries. These findings exemplify the economic concepts that new ideas build on prior innovation, and that

innovators in technology as well as supply chain design adapt quickly to emerging opportunities and are spurred by crisis. The intense competition among oligopsonistic lead firms induces a cascade of competitive innovations in marketing tools to further expand the diffusion and create economies of scale and scope.

Owing to space constraints, we could not evaluate the strategies firms used in procurement adaptation, nor the impacts on consumers and farmers of e-commerce diffusion. These are important topics for future research. Moreover, we were not able to explore heterogeneity in adoption of strategies over scales of firms, let alone countries and products. With future richer surveys and systematic case studies, these will be important agendas.

Without analysis of impacts, we cannot provide normative policy implications. But we can note the policy ingredients in the diffusion and adaptation story.

First, transaction costs appear to be important as challenges to e-commerce's diffusion. The general evidence, as in the case of Jumia, is that uncertainties and logistical costs slowed and reversed their FDI and operations. These appear to be more in Africa and less in Asia. This also affected supermarket diffusion in these regions (Reardon and Timmer 2012). Delivery intermediaries and logistics investments by e-commerce firms helped reduce some of these problems, but the transaction costs are still broad functions of roads, as products must be moved regardless of whether the transaction was arrived at by digitalization; thus government investments in roads and electricity are important. To arrive at digital deals, mobile phones are important, and thus communications infrastructure is important, as are government policies regarding mobile network rates (Torero, 2019). Thus government policies that lower logistics and mobile network costs would spur e-commerce diffusion.

Second, as in the supermarket revolution, FDI is important to e-commerce diffusion in a wide range of ways—in software and hardware company investments and thus technology transfer and their accompanying transfer of skilled labor and training; in the e-commerce firm's operations themselves; in supermarket diffusion that has been shown to bring with it hybrid forms using e-commerce; in the spread of delivery intermediaries across borders, and so on. Thus government policies liberalizing FDI in retail and e-commerce and various logistics and the computer industry would spur e-commerce diffusion.

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ENDNOTES

¹ In this paper we use a narrow definition of e-commerce as online “B2C” (business to consumer) retailing. We do not include other online marketing such as “B2B” (business to business), wholesaling, or “C2C” (consumer to consumer) online sales.

² Digitalization is also occurring in farming and rural finance, as shown in Benami and Carter (2021), Khanna (2020), and Birner et al. (2021).

³ The supermarket revolution's diffusion occurred in three waves with the first wave in the 1980s/1990s in developing countries then with higher incomes and more urbanized such as Brazil or South Korea, then the second wave in the 1990s/2000s in countries such as Thailand and Mexico, then the third wave in the 2000s/2010s in countries that recently liberalized their economies such as China and India and countries with more recently rising incomes and urbanization such as in Africa (Reardon & Timmer, 2012).

⁴ www.facebook.com/anikys.sauces?fref=search&__tn__=%2Cd%2CP-R&eid=ARBINV9hLFdqRzgN3g6ncGJct98RdDHXbCCvLDR_0NtYUcaTdWeaySmR8Dd1GtN0jp4xK5xXD1VTXCtv; <https://www.instagram.com/anikyssaues/>

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