COVID-19 and retail : the catalyst for e-commerce in Belgium?

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ABSTRACT

Since the turn of the century especially small, local retailers struggle with the advent of e-commerce. It is hence no surprise that the retail sector is one of the hardest-hit sectors in the current pandemic. To understand the short- and longer-term impacts of COVID-19 on retail, we conducted two surveys to understand ongoing changes in the sector. By contrasting changing consumer behavior with the actions taken by local retailers, we assess whether the current pandemic is potentially a catalyst for e-commerce in Belgium. We do this based on a newly constructed framework of e-retail accessibility, as the differences between online and physical retail require a revision of the traditional economic geographical perspective on retail performance as introduced by Christaller (1933). We conclude that the COVID-19 pandemic holds ample opportunities for an increase in the three components of e-retail accessibility, but that a lack of professionalism might prevent traditional local retailers to retain a share of the expanded online market. This could well mean the final blow for local brick and mortar shops if, as is predicted, the share of online shopping in total retail expenditure remains high after the pandemic.

KEYWORDS: e-commerce, retail, covid-19, Christaller, accessibility, Belgium

1. INTRODUCTION

The COVID-19 pandemic and resulting governmental restrictions hit the retail sector hard. While in the second quarter of 2020 the GDP in the Euro-area was down 12% year-on-year, the sales of non-food products dropped by 23.8% in April 2020 compared to a year before. Although total retail trade volume almost recovered after the months of crisis, the constitution of this volume changed dramatically, with mail orders and the internet taking over traditional sales (Eurostat, 2020c, 2020b). The temporary closure of stores, bars and restaurants, social distancing rules and contact restrictions and the limitation of non-essential travel halted physical shopping and reshuffled a sector already at a turning point.

Indeed, even before the spring of 2020 the traditional perspective on the organization of the retail sector was under scrutiny and examples of physical stores in decline were plentiful (Dolega & Lord, 2020). On the one hand, hypermobility and more free time since the 1960s implied that consumers were not anymore bound to the closest outlet, suggesting the *range*, i.e. the distance and time a consumer is willing to travel for reaching a shop, significantly expanded.

In addition, the increased mobility and scaling up in new formats drove a decentralization of retail activities out of the inner cities (Lord & Guy, 1999). On the other hand, online shopping on its turn was about to erase the notion of *range* as a measure of distance altogether (Cairncross, 2001) and required a revision of retail strategies (Hagberg et al., 2017). Resultantly there are plenty of examples of retail areas in decline and structural changes in shopping real estate (Singleton et al., 2016).

The physical restrictions related to the COVID-19 pandemic have temporarily put an end to hypermobility. To put it in terms of traditional economic geography theory, consumers' physical range was cut short. However, it does not amaze us that early published studies (e.g. Li et al., 2020; Pantano et al., 2020) show a shift towards the online channel, potentially finally fulfilling Cairncross' (2001) prediction of geography's death in retail activities. Yet at the same time, supply chain disruptions with increased freight shipment prices in combination with creative use of social media might make the consumer reconsider local products (Cappelli & Cini, 2020; Rhodes, 2020). The effect of the current pandemic on retail thus remains unclear.

Nonetheless, consumer behavior forcefully changed, accelerating the trends that were already occurring in the sector. With these evolutions, back to normal seems unrealistic once this pandemic is over. To plan for this new normal, or to support retailers on their way, Roggeveen & Sethuraman (2020) urge academics to start with the assessment of both short- and longer-term impacts of the pandemic on consumer behavior. Early studies provide insights from Germany and Canada (Dannenberg et al., 2020; Goddard, 2020). Yet, this paper goes one step further by making use of a dual perspective, i.e. by combining changes/disruptions both from the side of the consumer and from the retailer. By contrasting both perspectives we want to answer the following question: is COVID-19 the catalyst for e-commerce among local retailers in Belgium? In this study restaurants and bars are included as retailers because we discuss the presence of an online channel in the sector. As take-aways, the level of service within the establishment becomes irrelevant, turning restaurants and bars into product vendors similar to for example grocery stores. In this study we focus specifically on *local* retailers as they are a key player in the urban economy, yet with limited online presence before the COVID-19 pandemic. Given their limited size and hence capacities for mitigation, we assume they are more vulnerable to current impacts than franchises.

In the next section, we first provide an overview of evolutions in the retail sector until the spring of 2020. Next we propose a new framework of retail accessibility in an e-commerce context to better study the impacts of COVID-19. We feel such an innovative approach is necessary because the differences between online and physical retail require an update of the traditional geographical perspective on retail performance as introduced by Christaller (1933). After introducing our methodology in section 3, the results of two separate surveys are presented. First, one subset of the then-weekly online COVID-19 survey organized by the University of Antwerp in collaboration with Hasselt University and KU Leuven (https://www.uantwerpen.be/en/projects/corona-study/) resulted in over 80,000 questionnaires completed by consumers on the changes in their shopping behavior in Belgium. A second survey questioned over 200 small businesses about their mitigation strategies in Flanders, the northern part of Belgium. In the fifth section of this paper, we discuss the opportunities of improving e-retail accessibility based on the findings of both surveys. We conclude this paper in the last section by reflecting on the actions of retailers and discuss whether they made the most of the opportunities, or that missed chances mean the final blow for local brick and mortar shops.

2. RETAIL STRUCTURE AND THE IMPACT OF COVID-19

Christaller's central place theory (CPT) attempts to explain the hierarchical organization of retail (and other activities) based on two spatial and economic concepts: threshold and range. The former is the minimal quantity of consumption required for an establishment to survive. The latter is the maximum distance that consumers are willing to travel. The dimensions of the service area then result from the combination of threshold and range. With these concepts, the supply in a retail center can be predicted based on the number of consumers able and willing to travel to a certain location (Christaller, 1933). The theory also provides the opportunity to assess location decisions in a retail context. In effect, an establishment can only survive when its threshold of consumption is met within the range that consumers are willing to travel.

One of the assumptions underpinning the CPT was an isotropic landscape with equal transportation costs in all directions. These assumptions hold quite well to describe traditional retail landscapes but became under scrutiny due to suburbanization and sprawl of retail and other activities since the 1960s (Cant, 2019). The growth in the use of private cars combined with a shortening of working hours increased consumer's range and allowed people to move out of urban areas to suburban and sprawled locations (Verhetsel et al., 2010). This evolution reshuffled urban hierarchies as (i) people were not bound to the closest retailer anymore and (ii) congestion and parking issues decreased the attractiveness of existing retail infrastructure. Hence, retail activities followed the decentralization of population and unbundled from the inner cities towards peripheral locations such as (strip)malls (Lord & Guy, 1999; Verhetsel et al., forthcoming). While recent empirical studies do find prove for the prevalence of Christaller's urban hierarchies (see e.g. Morrill, 1987; Neal, 2011; van Meeteren & Poorthuis, 2018), the fundamental concepts of range and threshold to define hierarchies in a retail context required a revision. In that line, Dennis et al. (2002) uses examples of the locations of the (then) biggest shopping malls in the world to put forward the notion of attractiveness as a better explaining variable. The authors refer to the definition of attractiveness of a retail center by McGoldrick and Thompson (1992) as "a bundle of expected costs and rewards", which is linked to both of Christaller's concept because it considers the supply of goods present at a certain center as well as the costs to reach it.

Different measures of store attractiveness are identified in the literature (e.g. El-Adly, 2007; Teller, 2008), with the total retail surface being a popular proxy (Newing et al., 2015). However, to be used in Christaller's framework, such measures are too often limited to the "expected rewards", ignoring the "expected costs". Considering this, we propose to link the concepts of range and threshold to the broader definition of accessibility as presented by Geurs & van Wee (2004). The authors define four accessibility components (Figure 1): land use, individual, transportation and temporal. The interaction between demand and supply at certain locations, the personal needs and opportunities of individuals, the characteristics of the transport system and the availability of opportunities at different times of the day, impact both the "expected costs" and "expected rewards" and thus the broader concept of attractiveness. While this is strongly linked to the willingness of a consumer to travel a certain distance (range), the four factors at the same time define the threshold a retailer might need. For example, the competition for space between different land uses raises a retailer's investment and thus the minimum consumption necessary to survive. The consideration of using accessibility to discuss retail location choices is in line with the quantitative part of the retail geography literature which models the success of retail establishments via spatial interaction models (SIM). These models have their origins in gravity modelling derived from Newtonian physics and have a long history

as an applied retail location tool (i.e. Birkin et al., 2017; Huff, 1963; Lakshmanan & Hansen, 1965).

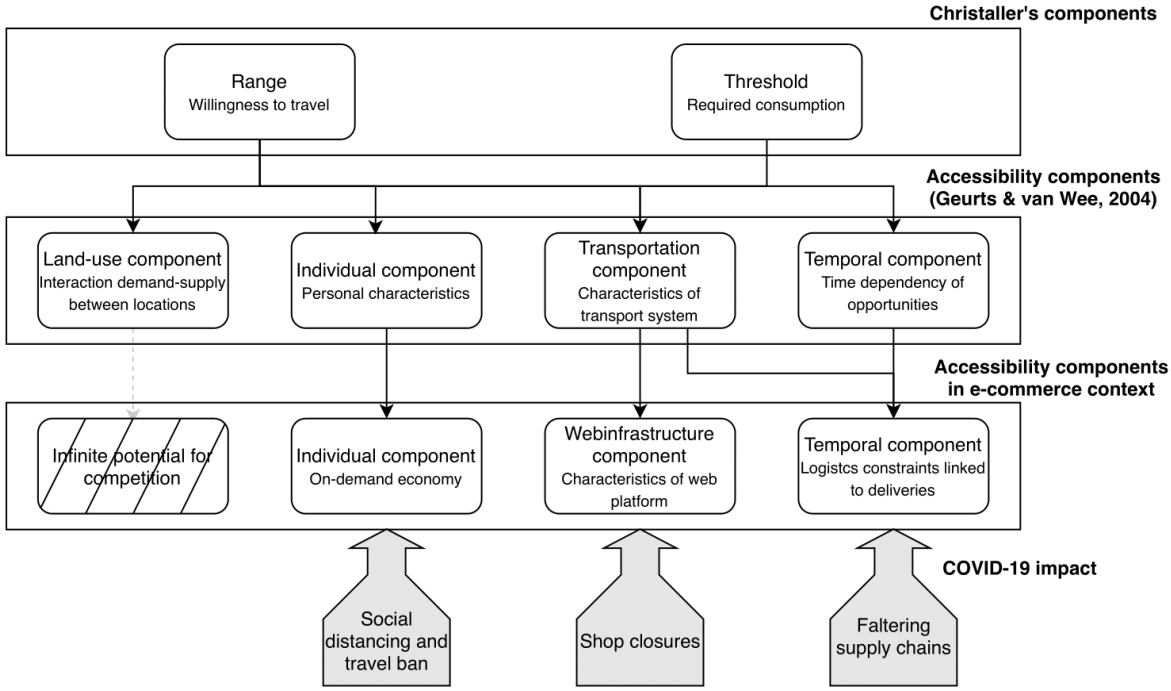


Figure 1: Accessibility in online retail

Whilst such models have been used successfully to locate physical stores in cooperation with businesses, the advent of e-commerce poses another complexity on the theoretical consideration of the retail landscape. This change for retailers is multidimensional in the sense that digitalisation brings multiple challenges to the retail concept (Grewal et al., 2017; Hagberg et al., 2016). Technology has transformed the world into a showroom without walls (Brynjolfsson et al., 2013), reshaping traditional retail settings that now include consumers' homes. This calls for a reconsideration of retail business models (Caro et al., 2020). With pure online players such as Amazon as early adopters, retail franchises followed swift in the adoption of online offerings, pursuing a multichannel strategy (Reynolds, 2002). The management of different channels however proved to be a difficult task for small retailers (Lewis & Cockrill, 2002). Boschma & Weltevreden (2008) for example empirically found a significant link between company size and e-commerce adoption and attributed this to the presence of resources. With the omnipresence of mobile devices and fast internet, and in line with the general shift towards an 'on-demand' economy (Frenken & Schor, 2017), the retail landscape continues to change. As different channels are linked to different steps in the consumer's path to purchase, consumers now have new "expected costs and rewards" consisting of a consistent retail offer and seamless transition from one channel to another, including free home deliveries or in-store pick-ups (Melero et al., 2016).

This requires a reconsideration of retail accessibility as introduced above. The rise of the internet has been termed plenty of times the death of distance, and this concern is especially relevant within the retail context (Cairncross, 2001; Lendle et al., 2016). In theory, the webspace is unlimited and hence there is no competition for locations anymore. Consumers from all around the world have equal access to an online store also implying that the online retailer has the rest of the world as a competitor. As a result, the first accessibility component has become irrelevant. However, both the demand and the supply of e-commerce are bound by geographical borders, yet in different ways compared to traditional retail activities. On the one

hand, empirical studies on online/offline consumer behavior do prove that online shopping is a spatial activity where small area variations in demand are driven by the complex interrelationships between consumer propensity to order online and the localized provision of (e-)retail services (Beckers et al., 2018; Hood et al., 2020; Kirby-Hawkins et al., 2019). Not only who buys online depends on his or her geographical location, but also the choice for the online store seems to be geographically bounded. For example, within Europe an estimated 24% of total B2C e-commerce turnover is generated by cross-border sales (Ecommerce News, 2020). While this is a significant number, it does indicate an overwhelming majority of "local" online retail purchases. On the other hand, the delivery of online ordered products comes at high costs. Distance matters for the shipping of online purchased goods, especially as shipment sizes decrease to the extent of one parcel per shipment, and hence transport costs go up. This is especially true for the last part of the distribution chain, i.e. the last mile (Cárdenas et al., 2017). Pick-up locations, store deliveries and warehouses all need to be within travel distance of the consumer, which is not always the case (Sanchez-Diaz et al., 2021). As a result, retailers indicate transportation as the major barrier for extending their catchment area and only less than half of the EU enterprises with an online channel has foreign customers (Eurostat, 2020a). For restaurants and bars selling food and drinks online, but also for farmers and other vendors of fresh products, this *Temporal component* is an even more restrictive part of their accessibility.

Given this discussion, the other three physical accessibility components do remain relevant, be it in a different form. First, the individual component seems to have gained even more traction, with the rise of the on-demand economy and the demand for ever more personalization in goods and services (2Flow, 2017; Gevelber, 2017; Jaconi, 2014). Second, transport infrastructure indicated how easy one could reach a physical shop by a transport mode. This component originally was related to both passenger and freight transport. Considering the passenger component, we mentioned earlier that, online, one could potentially access any site equally easy. However, this is currently not the case due to variation in webshop infrastructure. For example, one can imagine an online store with different language versions generates more traffic than a single-language one. Third, while online stores offer a 24/7 shopping experience, the delivery of the goods is subject to temporal constraints. Depending on where the logistics infrastructure is located, goods can be delivered within hours ("instant deliveries") or may take weeks to arrive.

The only way for the majority of retailers to meet the new consumer demand and thus achieve such retail accessibility, is a profound integration between channels (Verhoef et al., 2015). Herhausen et al. (2015) showed that such omnichannel strategy provides more synergies than cannibalization and offers the retailer competitive advantages over pure online players. Some examples for small retailers are their knowledge of the local consumer, their ability to quickly react to changes in consumer behavior and the potential of providing a personal service which differentiates them from an Amazon, Alibaba or Zalando (Quinn et al., 2013). However, local stores seem to remain reluctant to open an online channel (Bollweg, et al., 2020). By neglecting their online channel, they miss out on providing the demanding consumer with a full omnichannel experience, limiting their e-retail accessibility. Also, in terms of the *Web infrastructure* component, local retailers that do invest in online presence, tend to suffer from practical issues associated with opening and running a website often resulting in websites that are suboptimal and poorly maintained. Finally, the last component seems to pose the largest barrier (Gessner & Snodgrass, 2015). Due to limited volumes, shipments are more expensive and especially for cross-border web sales, transport charges are the main impediment (Eurostat, 2020a). On a local level, however, the physical outlets of local shops do continue to play a

fundamental role in the local provision of goods and often serve as a local social hub (Clarke & Banga, 2010).

The arrival of COVID-19 and resulting governmental actions provide another retail reshuffling. Its impact on retail accessibility is a combination of three effects (Cappelli & Cini, 2020; OECD, 2020): (i) social-distancing rules and travel bans; (ii) shop closures and; (iii) faltering global supply chains. All three effects impact the consumer and the retailer. First, from a consumer perspective, on and off restrictions imposed by many countries on non-essential travel limited the distance that consumers could travel to buy a product or service. This led for example to an increase in online purchases of exceptional goods, such as furniture, as they are traditionally only in sold in higher hierarchical places (cfr. Christaller). The evolution was reflected in the logistics sector, with a steep increase in complex and non-conveyable parcels (Gevaers, 2020). Social-distancing rules, queues because of reduced store capacity and the fear for acquiring infection due to close contacts further limited the appetite for physical shopping. Grashuis et al. (2020) demonstrate this by identifying a clear relation between the rate at which COVID-19 is spreading and the preference for the online channel. Laato et al. (2020) illustrate in another study how self-isolation led to unusual purchase behavior and Eger et al. (2021) show how fear is changing consumer behavior. In the end, temporary shop closures gave consumers no other choice and resulted in a boom in e-commerce (Comeos, 2020). Consumers massively shifted to the online channel (Li et al., 2020; Roggeveen & Sethuraman, 2020). Finally, the geographical borders of online shopping that were elaborated above seem to gain even more importance as hampering international freight flows may prelude the end of cheap international online shopping on platforms such as AliExpress (Gevaers & Dewulf, 2020).

Next, from a retail perspective shop closures simply prevented the continuation of the day-to-day activities of many non-essential businesses (Dannenberg et al., 2020; Pantano et al., 2020). Large online retailers and omnichannel retail franchises can capitalize on their business models while small businesses with only a physical presence are forced to consider the opening of an online channel as it seems they incur the greatest losses in revenue and profits in this pandemic (Bartik et al., 2020; Luke, 2020). Logistics organization proves to be a key challenge in this new situation. On the one hand retailers struggle with the (international) supply of inputs resulting in longer delivery timeframes (Bhatti et al., 2020; EY, 2020). On the other hand changing demand is testing the limits of the last mile (Avermaet, 2020; Urban Freight Lab, 2020). The question than arises whether these evolutions increase the overall e-retail accessibility and hence brings retailers and consumers closer together. This way, might COVID-19 be the catalyst for e-commerce among local retailers in Belgium? Or do we observe an increasing gap between demand and supply, and hence will corona be the final blow for small retail as we know it? By contrasting consumer's online demand with retailer's online supply, we assess the impacts of the current crisis on local retailers in an attempt to provide an answer to these questions. We hope these insights could support retailers appropriately towards a "new normal", after the pandemic subsides.

3. METHODOLOGY

In this paper, we study the impact of the COVID-19 pandemic on the Belgian retail sector. In March 2020, Belgium still displayed a relatively traditional retail landscape. The first wave of retail change resulted in a scattering of activities and the rise of strip malls along important axes (Cant, 2019). Yet (larger) local retail (inner city) centers managed to stay relevant as pleasant shopping areas mainly for funshopping while the peripheral locations hosted a lot of runshoppers (Verhetsel et al., forthcoming). This dual shopping landscape remained largely

intact despite the rise in online shopping. The dense urban network implied that the majority of the products could be found relatively close to home, limiting the need for consumers to use the online channel (Beckers et al., 2018). In 2019, 25% of the Belgian residents never shopped online. This percentage is higher than in all of its surrounding countries: Luxembourg (24%), France (20%), Germany (15%), Netherlands (12%) and the UK (9%) (Eurostat, 2019). At the same time, the number of Belgian online stores was also limited, and international pure online players dominated the e-commerce market. With little need for online products and a limited popularity of Belgian online stores, the e-retail accessibility of Belgian online stores in the spring of 2020 was very low.

From the 13th of March 2020, the Belgian federal government took action against the rising pandemic, including the closure of non-food stores during the weekend and closure of bars and restaurants (but allowing takeaway foods). One week later, the country went in lockdown and all non-food stores and (open air) food and non-food markets were forced to close. An exception was made for pharmacies. Non-essential travel was prohibited and physical distancing measures were mandated. The lockdown was relaxed in stages, with important dates relating to retail: reopening of Do It Yourself (DIY) stores and garden centres on 15th April, cloth stores on 4th May, and all other stores on 11th May, given precautionary measures, mainly in terms of shoppers density and sanitary requirements. As of 8th June, restaurants and bars could reopen under strict conditions. After relatively limited national precautionary measures over the summer, except for important surges countered by local measures (not directly affecting shops) in Antwerp and Brussels, the country went in a second - less restrictive – national lockdown on November 2nd, which included closure of non-essential shops until 1st December 2020.

In contrast to the current literature, this study applies a dual perspective, namely from consumer behavior and from retail geography. Using two different surveys we can capture both the consumers' and the retailers' changing behavior.

A. THE CONSUMER

Consumer's online shopping preferences are questioned as part of the ninth wave of a weekly online COVID-19 survey (https://www.uantwerpen.be/en/projects/corona-study/), which is open to the general Belgian public. The study was designed by the University of Antwerp in cooperation with the University of Hasselt and the KU Leuven. The ninth wave took place on the 12th of May 2020, hence one month after the introduction of the aforementioned measures, in the middle of the country's first lockdown.

Online purchases

Respondents were asked to indicate their monthly frequency of shopping online in four categories: food – franchise; food – local; non-food – franchise; non-food – local. Note that food includes both grocery stores and restaurants while local refers to independent businesses that, in contrast to franchises, cannot count on the support of a larger commercial group. Because of this lack of support, local retailers have significant less resources and knowledge to pursue an omnichannel strategy which makes them more vulnerable to the effects of the pandemic, as we highlighted above. The question was asked two times, once concerning the frequency before the COVID-19 pandemic, once concerning the past month (i.e. April 2020). Respondents could choose from a 6-point Likert-scale (Never; Once per month; Twice per month; Three times per month; Four or more times per month; Majority home delivery). The category "Majority home delivery" was selected if the majority of the respondent's purchases

are made online. The set of questions were converted in a binary variable per category, with value 0 when the respondent did not shop more online since COVID-19 for one of the four categories and 1 when he or she did.

Explanatory variables

Seven categories of explanatory variables are taken into account to understand the evolution of online shopping. In line with findings in previous studies that demonstrated the impact of socio-demographic background on online shopping behavior such as higher online purchases among the better educated (e.g. Beckers et al., 2018; Clarke, et al., 2015; Farag et al., 2006; Hood et al., 2020), the first category contains the variables age, gender and education. Next, the household composition with the number of children (none, 1 or 2, more than 2) can be linked to the time-availability for shopping, which has been hypothesized to be a driving factor for the use of the online shopping channel (Beckers et al., 2018). The third category contains indicators related to the respondent's employment. This category includes the current employment condition, changes to this condition due to COVID-19 and the number of days worked over the last week. These variables can be linked to the respondent's capacity to shop online, both in terms of financial capacity and time. The fourth category is the prudence of the respondent. Prudent persons are assumed to switch faster to the online channel. The independent variable here is whether the respondent knows someone who was severely sick. The fifth category contains the modal choice of the consumer. We use the new binary variable *Shift* representing a modal shift away from public transport towards private transport by the respondent since COVID-19. This because such a shift might have an impact on shopping behavior, as trip chaining opportunities might have changed. The sixth category is related to the built environment, which can be used to test Anderson's et al. (2003) efficiency theory that states that online shopping is higher when store provision is low. We link the morphology (urban-suburban-rural) based on the metropolitan regions as defined by Luyten & Van Hecke (2007) to the respondent's zip code. Finally, the category Welfare contains variables related to the overall welfare of the respondent – change in income and house ownership - which, together with the socio-demographic variables, are an indicator for the innovation-diffusion theory of Anderson et al. (2003) that explain e-commerce uptake in relation to technological innovation, spreading first from major urban areas among young, well-educated citizens. We note an overrepresentation of women and higher educated respondents, while the elderly are underrepresented. This might imply a bias towards more internet-savvy respondents and hence result in an overestimation of the e-commerce numbers. This effect is however damped because we look at the change of e-commerce behavior within our population.

Table 1: Explanatory variables available for predicting consumer behavior (Reference levels underscored)

Category	Variable	Levels
Socio-demographic	Age	18-29 (15%);30-39 (19%);40-49 (20%);50-59 (20%); 60-69 (20%); ≥70 (6%)
	Gender	Female (71%); Male (29%)
	Education	Lower education (1%); Secondary BSO (4%); Secondary TSO (11%); Secondary ASO (10%); College (37%); University

		(33%); Post-university (3%); Other (1%)
Household composition	Number of children	None (70%);1-2 (26%);3-4 (4%);>4 (0%)
Employment	Employment condition	None (35%); halftime (20%); fulltime (45%)
	Changes to employment condition	No (85%); Yes (15%)
	Number of days worked last week	0 (41%);1 (2%);2 (4%);3 (6%);4 (12%);5 (25%);6 (43%);7 (30%)
Prudence	Know someone severely sick	No (51%); Yes (49%)
Modal choice	Shift in modal choice	No change (92%); Change (8%)
Built environment	Morphology	Urban (45%); Suburban (36%); Rural (19%)
Welfare	Change in income	No change (71%); Decrease (27%); Increase (2%)
	House ownership	Owner (76%); Renter 14%); Housing in with parents/partner… (10%)

Models

The relations between the binary variables indicating changing online shopping frequency in each of the four categories and the predicting variables in Table 1 are first tested via a maximum likelihood test. After considering their statistical significance levels and autocorrelation, the relation between the remaining variables and the change in shopping frequency is explored in four individual binary logistic regressions. The logistic regression models the probability p of the occurrence of a change in shopping frequency of one of the categories through the logarithm of the odds ratio in a logit function:

$$logit(p) = ln\frac{p}{1-p} \tag{1}$$

This logit-transformed probability p is a continuous function that we use to predict parameters β for predictors x_1, x_2 .... Their significance is tested via the following linear regression:

$$logit(p) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \tag{2}$$

The odds one's online shopping frequency for one of the categories changed then becomes:

$$\frac{p}{1-p} = e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\cdots} \tag{3}$$

Assume x_1 concerns the variable Gender, equation 3 implies the odds a male bought more frequent online for a specific category over the odds a female bought more frequently online, increases with e^{β_1}, keeping all other variables constant.

B. THE RETAILER

In parallel, another online survey is distributed through the Organization for the Self-Employed and SMEs (UNIZO) and the regional economic departments of the Flemish provinces to question the side of the retailer. By targeting the members of UNIZO, we aim to capture the responses of small retailers. The survey was launched 22nd April and answers were considered till 1st July 2020.

The survey consists of four blocks (cf. Figure 2). The blocks are (i) the prevalence of the online sales channel; (ii) the set-up, performance and delivery of the online channel; (iii) the view on e-commerce in the future and (iv) general characteristics of the store. First, the respondents are asked whether they operated an online channel (block 1) before COVID-19, that is before 13th March. An online channel is defined as selling goods in one of the following ways: Mail or phone; Website of a third party (e.g. Amazon); Social media (e.g. Facebook; Instagram…) or Own company website. If yes, the respondent is redirected to the second block, that is on the set-up, performance and delivery of the online channel. If not, the reasons for not operating such channel are questioned after which the respondent continues the survey flow. Second, the respondents are asked whether any change occurred to their online channel (i.e. opened one in case none existed or elaborated an existing channel) since 13th March. This is a repeat of the first block but for another time period. If yes, the respondent is redirected again to the second block. Finally, the third and fourth block round up the questionnaire.

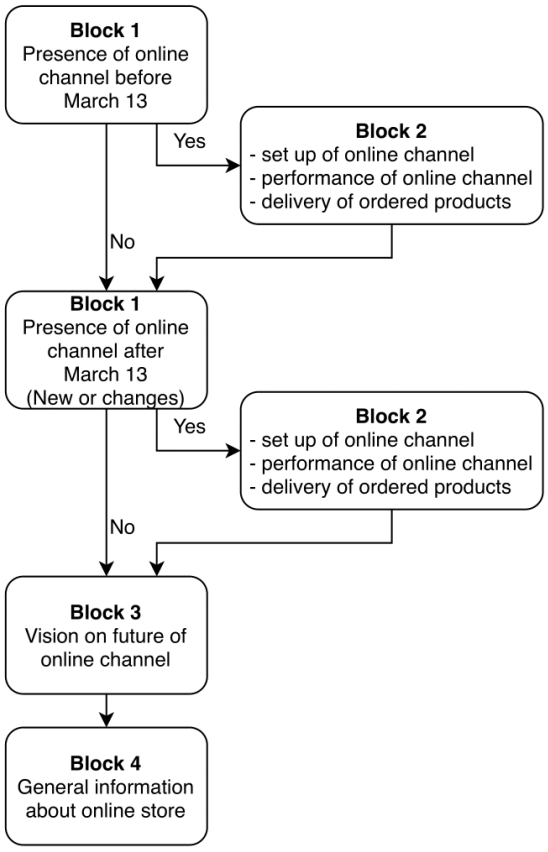


Figure 2: Flowchart of retailers' survey

The second block consists of three parts. First, the respondent is asked whether he or she received help to construct or adapt the online channel (No; Yes, from family; Yes, from a professional company; Yes from a federation). Next, we ask the number of online orders per week. Finally, we question how fast the delivery occurs, who is responsible for the logistics operations (Pick-up; By the retailer; By logistics player), within which range deliveries take

place and whether transport costs are recovered via the price setting. The third block questions the respondent's view on the importance of the online channel going forward. Central in this block is a 5-point Likert scale to answer, "How necessary is the online channel to survive in the future?". In the fourth block the sector, size and location of the store are questioned.

4. RESULTS: ONLINE RETAIL DURING COVID-19 IN BELGIUM

A. THE CONSUMER

In total 78,047 responses are retained after eliminating the respondents not living in Belgium. There is an overrepresentation of women (71% compared to 51% in Belgium), while the responses are almost equally divided over the 10-year age groups between 18 and 70 years. Average online purchase frequency for the four categories is provided in Figure 3. The effect of COVID-19 is visible with increases in both consumables for the franchises as well as the local businesses. In absolute numbers, *nonfood - franchise* products are unsurprisingly the most purchased items. This category includes pure players such as Amazon and Zalando. They increase their turnover while they do not have stores to close during COVID-19 measures, indicating them as the early winners in the retail sector. Encouraging is the significant rise in online purchases from local stores, both for the food and non-food sector. Local food purchases through the online channel increase by more than 110%. The majority of this rise can be explained by the closure of restaurants. The online purchases of local nonfood increase by 62% compared to 18% for franchises.

Although the lower relative increase for *nonfood - franchise* can be attributed to an already higher number of online sales before COVID-19, the difference between the *nonfood - franchise* increase and the *nonfood - local* is significant, making us believe there is a preference for local products, even online. We identify three factors that might cause this deliberate choice for local products online. First, there is large solidarity due to everyone being in this together. Those who can simply continue to work from home support those who have more difficulties, especially if it is the bike store or deli around the corner. Such support can of course also result from a certain level of self-interest assuming one wants to keep the provision of services in its surroundings. Second, the shop local campaigns by sector federations such as UNIZO as well as initiatives taken by (regional and local) authorities seem to be effective. Third, picking up a purchase at a shop nearby or being delivered by the shop owner may have provided a small but welcome opportunity for social contact during isolation.

Online purchases of food from franchises remains low. These are mostly purchases from supermarkets, which were allowed to remain open during the lockdown. Due to the sprawled retail landscape in Belgium, supermarket accessibility is relatively high. However, all supermarkets that boasted an online channel for delivery or pick-up pre-pandemic did show significant delays at the beginning of the lockdown (RetailDetail, 2020), pointing to also higher uptakes of online purchases of *food - franchise* products.

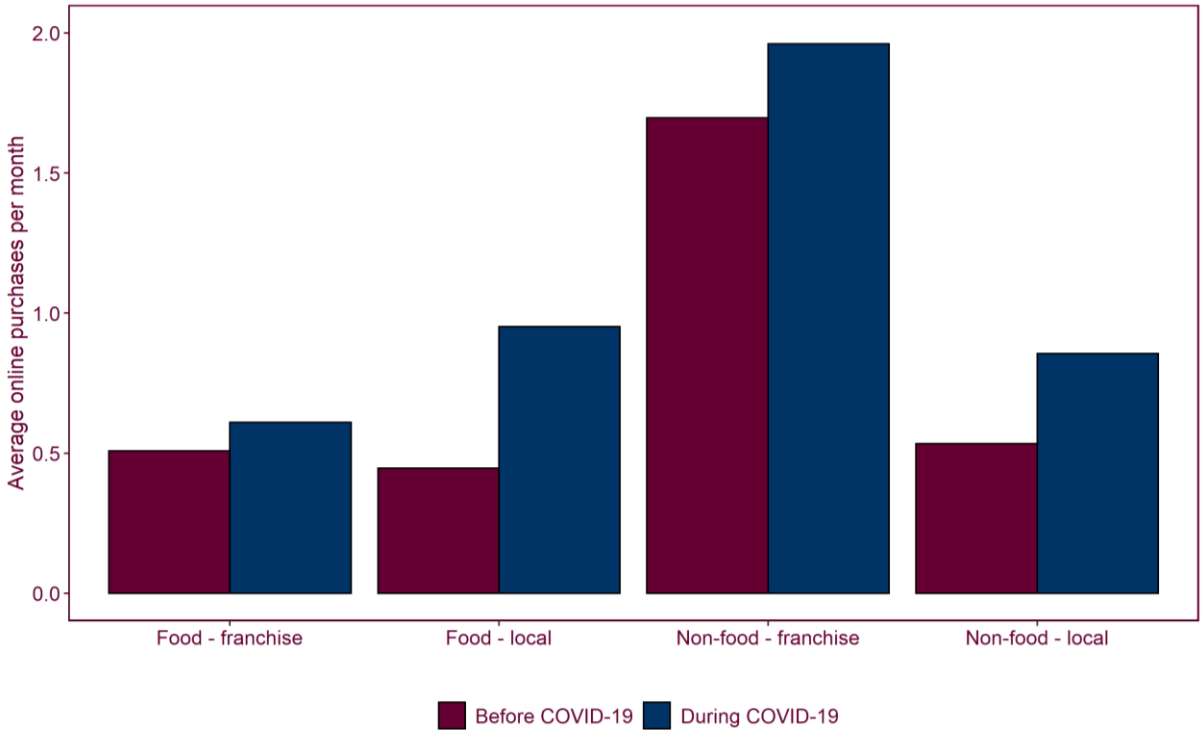


Figure 3: Change in online purchases pre-pandemic vs during the first pandemic wave

Next, we look at whether there are differences in who shops online for the four categories. First, Table 2 depicts the results of the maximum likelihood tests for the four categories of shopping frequency, indicating the explaining variables. Non-food seems to be more dependent on the contextual setting of the respondent, as more variables do have a significant relation. The most important variables that boast explanation power are *age, gender, children* and *ownership. Change in income* is the only variable that is not significant for any of the categories. This variable, together with *Employment* as it showed a high correlation with *Days worked*, are left out of the ensuing analysis.

Table 2: Maximum Likelihood results for (a) food - franchise; (b) food - local; (c) nonfood - franchise and (d) nonfood – local. Significance: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Food franchise	Df	Deviance	Pr(>Chi)	Sign
Age	5	143,25	< 2.2e-16	***
Gender	1	5,48	0.01919	*
Education	7	11,50	0.11823	n.s.
Children	3	31,96	5,35E-04	***
Employment	2	7,33	0.02563	*
Days worked	7	10,67	0.15358	n.s.
Change empl.	1	0,32	0.57188	n.s.
Knowl. sick person	1	1,31	0.25273	n.s.
Shift modal choice	1	5,15	0.02329	*
Morphology	3	21,13	2,58E-02	***
Change income	2	0,78	0.67693	n.s.
Ownership	2	27,94	8,55E-04	***

(a) food - franchise

Food local	Df	Deviance	Pr(>Chi)	Sign
Age	5	552.43	< 2.2e-16	***
Gender	1	9.47	0.002085	**
Education	7	322.24	< 2.2e-16	***
Children	3	109.30	< 2.2e-16	***
Employment	2	86.36	< 2.2e-16	***
Days worked	7	45.26	1.217e-07	***
Change empl.	1	0.00	0.994531	n.s.
Knowl. sick person	1	67.30	2.334e-16	***
Shift modal choice	1	0.94	0.333452	n.s.
Morphology	3	3.28	0.194326	n.s.
Change income	2	1.05	0.588557	n.s.
Ownership	2	119.51	< 2.2e-16	***

(b) food - local

Non-food franchise	Df	Deviance	Pr(>Chi)	Sign
Age	5	542.95	< 2.2e-16	***
Gender	1	94.75	< 2.2e-16	***
Education	7	392.03	< 2.2e-16	***
Children	3	158.75	< 2.2e-16	***

Non-food local	Df	Deviance	Pr(>Chi)	Sign
Age	5	860.17	< 2.2e-16	***
Gender	1	129.19	< 2.2e-16	***
Education	7	367.77	< 2.2e-16	***
Children	3	100.94	< 2.2e-16	***

Employment	2	40.35	1.733e-09	***	Employment	2	110.95	< 2.2e-16	***
Days worked	7	31.69	4.632e-05	***	Days worked	7	18.78	0.0089171	**
Change empl.	1	0.21	0.6453	n.s.	Change empl.	1	11.62	0.0006512	***
Knowl. sick person	1	4.70	0.0301	*	Knowl. sick person	1	36.62	1.437e-09	***
Shift modal choice	1	25.58	4.235e-07	***	Shift modal choice	1	9.88	0.0016706	**
Morphology	3	21.32	9.045e-05	***	Morphology	3	32.65	8,14E-05	***
Change income	2	1.23	0.5419	n.s.	Change income	2	3.46	0.1775689	n.s.
Ownership	2	61.84	3.725e-14	***	Ownership	2	98.02	< 2.2e-16	***

(c) nonfood - franchise (d) nonfood - local

Second, the estimated coefficients, their standard deviation and significance level can be found in Table 3. Overall, *food - franchise* differs strongly from the three other models as fewer variables have prediction power. This was also evident from Table 2 and might be related to a relatively little increase in purchases in this segment. The three remaining models show similar behavior of the significant variables. The majority of the statistically relevant variables are so in all three. The largest increase in odds ratio is always *education* (except for *food - franchise*). Higher educated people shop online significantly more since COVID-19. The larger acquaintance with the internet of these people has earlier been indicated as a potential explanation for higher frequencies of online shopping (Beckers et al., 2018). Another potential explanation is that their incomes have been less under threat during the pandemic. *Age* is also strongly influencing the shift towards the online channel. Increasing age implies lower probabilities for going online, with the elderly (70+) seeing the lowest probability of shopping more online. The decrease in the probability of shopping more online with increasing age is stronger for the *nonfood - local* products, potentially due to the online stores being less easy to find online. That is because a share of the sales occurs through social media platforms instead of a traditional online store. The lack of resilience in shopping behavior for the elderly might imply that COVID-19 further complicates accessibility to products. Indeed, even before the pandemic, the evolutions within the retail sector led to issues related to (food) inaccessibility for the less mobile within the region (Cant, 2019). The number of children also has a positive prediction power in each of the models, indicating the importance of the time-component in online shopping behavior. The closure of schools and day-care meant that parents were obliged to homeschool their children next to their own employment, limiting their available time. Also, families with children have in general a more frequent need for products and were more obliged to look for alternatives for the closed physical outlets. The positive coefficient for the length of the working week is also an indication of the importance of time in the decision of the shopping channel. Finally, increasing urbanization seems to result in higher uptakes of the online channel, and this for all categories. This finding seems to confirm Anderson's et al. (2003) innovation-diffusion theory remains prevalent. In summary, the young, better educated urban households with children are the main drivers of the increased demand.

Table 3: Logit regression results for the different online purchases

Variable	**Food - franchise**	**Food - local**	**Non-food - franchise**	**Non-food - local**
(Intercept)	-2.17 (0.20) ***	-2.03 (0.19) ***	-1.21 (0.15) ***	-1.60 (0.18) ***
30-39 year	0.09 (0.05) .	0.03 (0.04) n.s.	-0.01 (0.03) n.s.	0.04 (0.04) n.s.
40-49 year	0.01 (0.05) n.s.	-0.04 (0.04) n.s.	-0.06 (0.03) .	-0.11 (0.04) **
50-59 year	-0.10 (0.05) .	-0.22 (0.04) ***	-0.22 (0.03) ***	-0.37 (0.04) ***
60-69 year	-0.35 (0.07) ***	-0.59 (0.05) ***	-0.43 (0.05) ***	-0.68 (0.05) ***
≥70	-0.64 (0.25) *	-0.93 (0.20) ***	-1.21 (0.20) ***	-2.12 (0.33) ***
Male	0.07 (0.03) *	-0.06 (0.02) *	-0.18 (0.02) ***	-0.25 (0.02) ***
Secondary BSO	0.13 (0.21) n.s.	0.54 (0.20) ***	0.08 (0.16) *	0.03 (0.18) .

Secondary TSO	0.09 (0.20) n.s.	0.72 (0.19) **	0.31 (0.15) n.s.	0.29 (0.17) n.s.
Secondary ASO/KSO	0.13 (0.20) n.s.	0.82 (0.19) ***	0.34 (0.15) *	0.32 (0.18) .
College	0.17 (0.20) n.s.	0.91 (0.19) ***	0.54 (0.15) ***	0.50 (0.17) **
University	0.19 (0.20) n.s.	1.09 (0.19) ***	0.70 (0.15) ***	0.67 (0.17) ***
Post-university	0.20 (0.21) n.s.	1.08 (0.20) ***	0.70 (0.16) ***	0.82 (0.18) ***
Other	0.05 (0.25) n.s.	0.62 (0.23) **	0.19 (0.19) n.s.	0.21 (0.22) n.s.
1-2 children	0.17 (0.03) ***	0.21 (0.02) ***	0.26 (0.02) ***	0.22 (0.02) ***
3-4 children	0.11 (0.06) .	0.09 (0.04) *	0.28 (0.04) ***	0.19 (0.04) ***
>4 children	0.29 (0.33) n.s.	0.12 (0.27) n.s.	-0.10 (0.27) n.s.	0.25 (0.27) n.s.
1 day worked	-0.04 (0.09) n.s.	0.10 (0.07) n.s.	0.12 (0.06) *	0.12 (0.07) .
2 days worked	-0.04 (0.06) n.s.	0.09 (0.05) .	0.08 (0.05) .	0.08 (0.05) n.s.
3 days worked	-0.08 (0.06) n.s.	0.14 (0.04) **	0.16 (0.04) ***	0.18 (0.04) ***
4 days worked	-0.05 (0.05) n.s.	0.19 (0.04) ***	0.14 (0.04) ***	0.20 (0.04) ***
5 days worked	0.01 (0.04) n.s.	0.23 (0.03) ***	0.13 (0.03) ***	0.23 (0.03) ***
6 days worked	-0.11 (0.07) .	0.10 (0.05) *	0.03 (0.05) n.s.	0.16 (0.05) **
7 days worked	-0.02 (0.07) n.s.	0.10 (0.06) .	-0.01 (0.05) n.s.	0.10 (0.06) .
Change in empl. sit.	0.02 (0.04) n.s.	0.01 (0.03) n.s.	-0.01 (0.03) n.s.	0.12 (0.03) ***
Knowing someone sick	0.03 (0.03) n.s.	0.16 (0.02) ***	0.04 (0.02) *	0.12 (0.02) ***
Change transport mode	0.11 (0.05) *	0.04 (0.04) n.s.	0.17 (0.03) ***	0.11 (0.04) **
Suburban	0.10 (0.04) **	0.03 (0.03) n.s.	0.04 (0.03) n.s.	0.00 (0.03) n.s.
Urban	0.16 (0.04)***	0.06 (0.03) *	0.10 (0.03) ***	0.12 (0.03) ***
Renting	-0.09 (0.04) *	-0.29 (0.03) ***	-0.14 (0.03) ***	-0.25 (0.03) ***
Housing in with parent,…	-0.30 (0.05) ***	-0.36 (0.04) ***	-0.29 (0.04) ***	-0.37 (0.04) ***

Significance : '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

B. THE RETAILER

In total 389 respondents started the survey; 182 Flemish (northern part of Belgium) entrepreneurs completed all questions. The survey specifically targeted local, small businesses. Hence, 50% of the responding companies consist of one employee only, 87% of the respondents employ maximum 5 people. The top three sectors present in the sample are *Clothing and luxury*, *Convenience* (groceries) and *Leisure* (horeca) (together 65% of the respondents, see Table 4). Of these businesses, only 40% operated an online sales channel (e.g. website, app, social media…) before March 2020. According to the respondents, the biggest issue with selling online was the maintenance of the online channel, followed by the shipping. Given that less than half of the stores operated an online channel, the pandemic hit the retail and horeca sectors very hard. Overall the respondents indicate a loss in turnover of over 75%.

Table 4: Profile of retailers in the survey

Variable	**Category**	**Share**
Sector	Clothing and luxury	23%
	Convenience	23%
	Home and garden	7%
	Leisure	21%
	Other activities	3%
	Other retailing	15%
	Transport and fuel	1%
	Recreational goods	7%
Number of employees	1	50%

	2-5	37%
	6-10	5%
	11-50	7%
	50+	1%
Number of physical points	1	83%
	2	10%
	2+	7%
Location	Main shopping street	25%
	Other shopping strees	29%
	Residential area	8%
	Rural area	7%
	Gallery or shopping mal	3%
	Strip mall	11%
	Market	10%
	Other	7%

The survey, however, notes a significant response to the pandemic by the retailers. 50% of those not operating an online channel before the pandemic opened a webshop at the beginning of the lockdown. As a result, an estimated 70% of the small entrepreneurs had a working online channel during the first pandemic wave lockdown. The increase in online shopping as highlighted in the previous section is visible among local retailers (Figure 4): the median number of online orders per week triples from 5 to 15. On average, the number of online orders doubles from 36 to 79. With their online channel, retailers are able to reach on average 23% of their pre-COVID19 turnover.

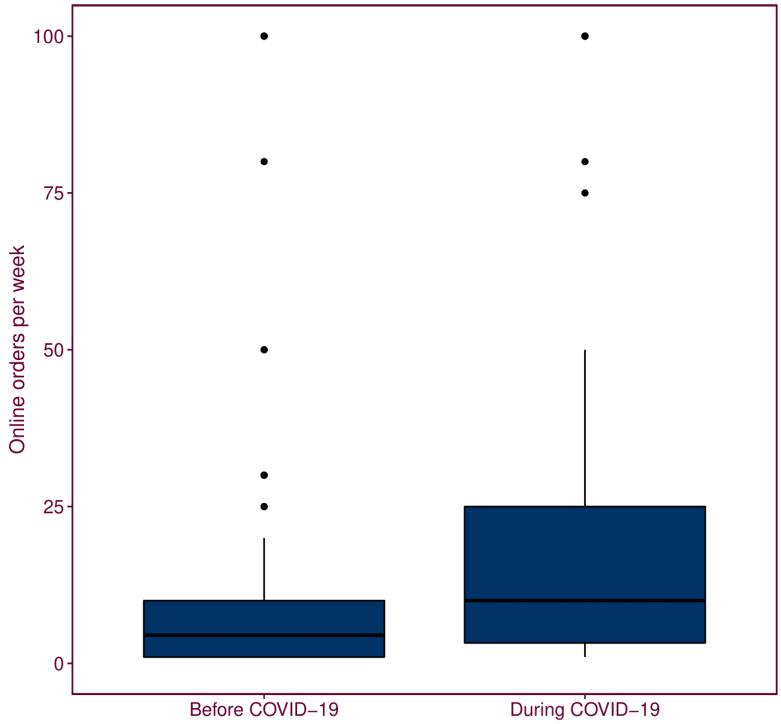
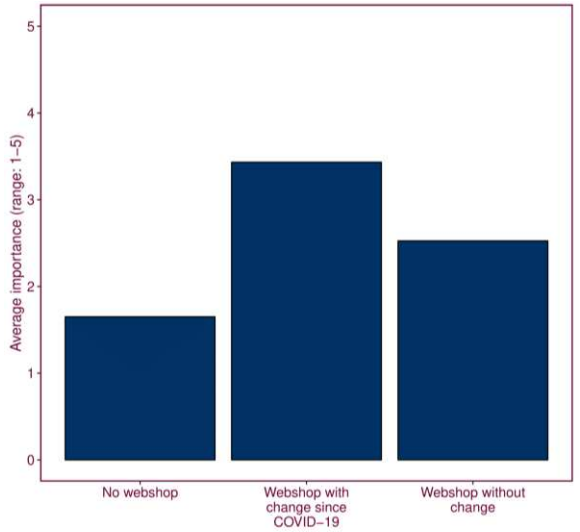


Figure 4: Evolution of online orders (webshop before COVID-19).

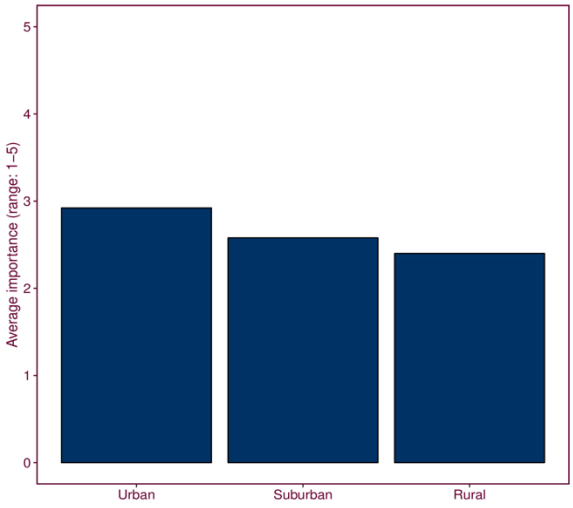
The survey, however, indicates that the large majority of entrepreneurs set up an online sales channel in a rather unprofessional way. Sixty percent did not ask for a delivery fee. This might be expected as the local retailers need to compete with large players that might offer similar products at a lower price already due to economies of scale. Fifty percent of the respondents indicate that payments occur only during or after the pick-up/delivery, 57% of the respondents created the online channel by him or herself and 49% of the respondents do the delivery

themselves, the majority of them even over distances further than 10km. Such numbers hint that small retailers rather unprofessionally put together their online channel. This is also noticeable from our study of the local retailers' websites. Many setups are rather pragmatic, and retailers seem to fall back on concepts that existed before but seemed to have died out, such as a traditional milk route in the neighborhood by the local deli. We have the impression that many retailers applied some "survival" strategies to get through the temporary lockdown.

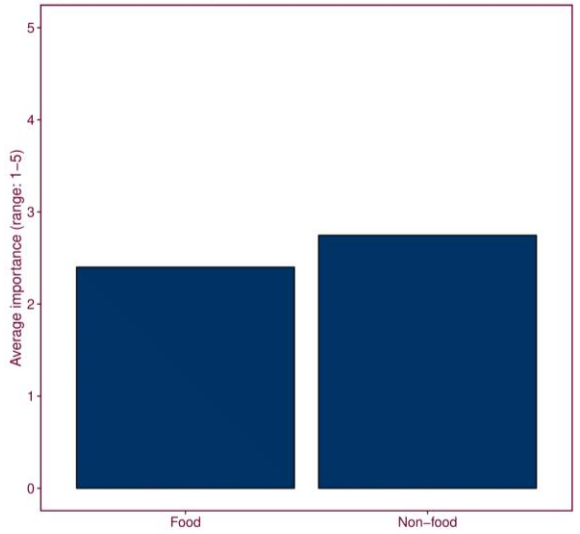
Some retailers that opened a new channel seem however to be aware of the permanence of online shopping (Figure 5a), raising the question why the new online channels have a rather "pop-up" feeling to them. Yet, the overall impression on the importance of the online store for future sales remains nonetheless average to low. Small differences exist between urban businesses and rural ones (Figure 5b – 2.9 (urban) vs 2.4 (rural)). This might be related to the higher e-commerce adoption of the urban shopper found above. The non-food sector sees its online channel slightly more important compared to the food sector. This might be related to earlier findings in Figure 3 which showed a surprisingly large increase in local non-food shopping. Non-food retailers might have noticed this behavior and recognized the opportunities of their online store.



(a) type



(b) location



(c) sector

Figure 5:Indicated average importance of online sales channel in the future according to (a) type, (b) location and (c) sector

5. THE INCREASE IN E-RETAIL ACCESSIBILITY

Given the findings above, the big winners of the COVID-19 crisis in the retail sector seem to be the pure online players that already had an established web-infrastructure before March 2020 (see figure 3, also Belga, 2020; De Schamphelaere, 2020; Deckmyn, 2020). They can capitalize on the shoppers that found their way to the online channel for the first time, or more frequently. Moreover, they often do not have a physical counterpart for which rent has to be paid during the lockdown. Small local shops are impacted in different ways.

For local non-food shops, the pandemic increases the potential e-retail accessibility (cf. Figure 1) and hence brings consumers and businesses together. First, concerning the *Individual component*, Figure 3 shows retailers manage to attract local consumers. A couple of explanations can be provided. Travel restrictions forces consumers to (re)discover local vendors and the limitation of social contact increases their role as a social and accessible hub (for example during pick-ups). Further, the many campaigns from sector federations and local governments to grow the solidarity with the sector, seemingly successfully instigate a "shop local" mindset. Second, the digital switch forces enterprises to go online, increasing their *Web infrastructure component*. It seems COVID-19 provides the push that might have been needed and results in an increase in the number of local retailers with an online presence from 40% to 70%. Further, by smartly leveraging social media as an important communication channel during the lockdown, small retailers are able to increase the number of followers in their surroundings (Rhodes, 2020). A local following on social media provides small retailers with a tool to receive instant feedback from their most important clientele, and to remark and react to new trends. While large players might do this through big data analytics, local retailers should have the advantage of detecting differences on a more detailed geographical scale. Third, changes in the *Temporal component* are more arbitrary. Given that most purchases come from the local shopper, delivery distances are rather short. These short distances could lead to more sustainable (25% of the retailers indicated the use of a sustainable delivery mode) or faster deliveries (23% of the retailers deliver within 24h), while pick-ups can be a costless alternative. The large share of deliveries conducted by the retailer himself might not be the most professional approach, but the personal touch does increase the customer service level. This potentially improves the *Temporal component* even further, given that customer service is becoming an important part of the last mile delivery process (Winkenbach & Janjevic, 2017).

For food retail, we observe slightly different results. Not all food retailers were forced into closure. On the one hand the groceries sector such as supermarkets, convenience stores and small bakeries, butchers, … were allowed to remain open. Restaurants and bars on the other hand are the businesses that had the longest forced closures. Despite being able to remain open, even the groceries group shows a slight increase in online shopping, with supermarkets constituting the majority of the *food-franchise* group in Figure 3, and local shops as a part of the *food-local* group. As a result, supermarkets struggle to cope with the strong rise in online orders (RetailDetail, 2020). Also the small bakeries, butchers… make a shift towards online despite being allowed to remain open. Yet, these shops benefit also from an increase in the *Individual component* for similar reasons as the nonfood retailers. This effect also plays in the Horeca sector, demonstrated by large increases in the *food-local* category on the consumer side. Surprisingly not many Horeca outlets operated an online channel before COVID-19, despite a well-developed delivery market with Deliveroo, UberEATS and Takeaway. The uptake of e-

commerce in this sector is however significant (+70% opened an online channel), strongly increasing the *Web infrastructure component* of this sector's online accessibility. This uptake was made possible due to the existing delivery market, which allows the restaurants and bars to reach an estimated 25% of their pre-COVID turnover during the lockdown.

Overall COVID-19 seems to increase e-retail accessibility in our study area, largely due to a tightening of the geographical borders of online shopping. Marketing - by stressing "local" and better knowledge of regionalized consumer demand – and logistics – with its impact on the temporal component – are the key factors for small businesses due to their closeness to the consumer. The pandemic thus emphasized the competitive advantages for local retailers that were identified in section 2. Large online players will continue to dominate the online retail market due to economies of scale, but the importance of the geographical component of e-commerce safeguards a place for small retailers. An important remaining question is to what extent this increased e-retail accessibility offsets a potential decrease in traditional retail accessibility due to store closures. This is especially relevant given our observation that it are the young, better educated urban households with children that mainly benefit from the increased online supply, feeding the hypothesis of increasing inaccessibility for the less mobile within the region, as we observe in other case studies (Sanchez-Diaz et al., 2021; Videira et al., forthcoming). In order to shed light on this issue, we encourage future research to study whether COVID-induced online channels complement or substitute existing retail, and how this impacts (e-)retail accessibility, both for the retailer and the consumer.

6. THE LACK OF PROFESSIONALISM PREVENTS FUNDAMENTAL CHANGE ON THE RETAIL SIDE

Since the turn of the century, the advent of e-commerce was increasingly changing the retail landscape. To capture the impact of this change on retail accessibility, we provide in this paper a first proposal of a framework to study e-retail accessibility. While overall low e-commerce numbers before 2020 resulted in low accessibility of Belgian online stores, two surveys that were conducted in the scope of this paper indicated a significant boom in online shopping in Belgium due to the outbreak of the COVID-19 pandemic and associated measures.

Local retailers responded by opening online channels to the extent that by the end of the first lockdown, 70% of the small retail landscape operated some online retail channel. As presented in the discussion section, this significantly increased the e-retail accessibility in Belgium and made sure, together with the subsidies provided by the regional and federal governments, that up to now the majority of the retailers managed to overcome this crisis. However, the survey among local retailers hinted at a lack of professionalism concerning the management of the new online channels. Many stores seem "quick fixes" that have rather low importance in the plans of the respondents. While this might mean that local shopping streets will look the same post-COVID, it is also a missed opportunity.

Modelling results indicate that the young, urban households with children are driving the increased online demand. Now that the barrier of the extra handling costs for the preparation of the shopping cart is taken, these consumers might continue to enjoy the benefits of not having to visit the physical outlet. If the local shop neglects its online channel when physical retail resumes, the large (international) online players will attract these shoppers and local shops will lose a share of their turnover. This might prove the final blow in an already difficult retail landscape.

Policymakers and sector federations recognize this issue, and budgets are set aside to support local retailers in professionalizing their online stores for example through trainings by UNIZO. Also, private players, often large pure players such as Bol.com notice the opportunities and turn their websites into marketplaces where small retailers can sell their products in return for a fixed percentage of their turnover. This way these large players only increase their hold on the online market. Therefore, it remains to be seen how many of the entrepreneurs will take up the challenge to make a decent online outlet and to what extent they can compete with the large online players. Further research should point out whether local entrepreneurs were able to capitalize on the efforts made up till now.

The logistics sector responds to opportunities. In the case of Belgium, we observe different initiatives by niche logistics players focusing on facilitating the shipment of low volumes of online purchases by local consumers. These include for example the implementation of locker boxes that local companies can use for a reduced fee, while it allows customers to pay directly at the locker. Other examples are new business packages for "slow deliveries", i.e. giving the logistics operator the time to consolidate shipments from different local online stores over a couple of days to reduce the price per shipment. Moreover, a lot of these initiatives are possible to be done by sustainable logistics, such as cargo bikes. Such solutions can greatly support small businesses and provide a new dimension to shopping local. If such changes can support local businesses to establish the online store as a full-fledged sales channel going forward, COVID-19 might eventually have a positive and sustainable connotation in hindsight.

Acknowledgments

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