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Towards sustainable e-grocery delivery: investigating consumer's preferences in an Italian region

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Abstract

Covid-19 pandemic, and its related restrictions, represented an opportunity for e-grocery growth in Italy, leading to a rethinking of the current purchasing and consumption patterns. On particular concern is the last-mile delivery, when food is delivered to the final consumer, representing the most impactful stage of the entire food supply chain. Where many studies focused on economic and environmental externalities produced by the delivery, a much debated and under-analysed question is the working conditions of operators engaged in the food delivery sector. More precisely, this contribution aims at analysing consumers' perceptions towards the economic, environmental, and social sustainability of the different food delivery options. We used a computer-assisted telephone interviewing (CATI) on a sample of 385 respondents in the Province of Trento (North-East Italy) to explore the e-grocery purchasing behaviour and the preferred delivery options. The results reveal that the socio-economic variables and geographical elements are explanatory of the consumers' sensitivity towards the sustainability of delivery options, as well as the likelihood of making online food purchases. This work includes suggestions for local policy makers and insights for future work.

Keywords [e-grocery, sustainability, food delivery, working condition, Italy, last-mile logistics, CATI]

JEL code Marketing and Advertising: Other M39- Agriculture: Aggregate Supply and Demand Analysis Q11- Agriculture: Food Policy Q18- Environmental Economics: Sustainability

1. Introduction

E-commerce and e-groceries have expanded quickly globally during the past several years. This development, which involved a variety of items, including foodstuffs, was facilitated by the expansion of the internet, e-commerce websites, mobile phone apps, and mobile payments (Shang & Wu, 2017).

Despite the fact that global online grocery buying still only accounts for a small portion of all online purchases (Nakano, 2022), the Covid-19 pandemic has encouraged an increase in online food sales. People reacted to the emergency in this unprecedented scenario by storing massive amounts of food and buying in a panic, which encouraged the experimentation of novel methods of purchasing food (Saphores et al., 2022). These trends were also confirmed in Italy (Polenzani & Marchini, 2022), where preventive measures in response to the coronavirus pandemic resulted in an increase in digitalisation and a shift in food purchasing behavior (Alaimo et al., 2020). In fact, e-grocery experiences a 55% growth in 2020. (Osservatori.net, 2020). This rapid development has piqued the interest of policymakers and civil society, who are now debating how to rethink current purchasing and consumption habits.

With the rise of e-commerce and e-grocery, a new challenge has emerged in sustainable last-mile delivery, which refers to delivering goods purchased online to end consumers. Last-mile delivery is regarded as the most expensive, polluting, and socially significant stage of the food supply chain (Saad & Bahadori, 2018). A growing body of literature has focused solely on the economic and environmental externalities produced by B2C e-commerce and e-grocery delivery (Siragusa & Tumino, 2021 and Seghezzi & Mangiaracina, 2021), while the effects on social sustainability remain largely underdeveloped in scholarship.

Concerning the environmental impacts of last-mile food logistics, several studies have found that vehicle emissions, traffic congestion, and noise pollution have a negative impact on the environment, accounting for up to 50% of total logistics costs (Liao et al., 2017). According to an International Transport Forum (ITF) study, last-mile delivery of goods accounts for approximately 30% of total urban transport-related CO₂ emissions in cities. Similarly, McKinsey & Company (2016) discovered that last-mile delivery of goods accounted for 40% of total transportation sector emissions.

Several solutions have been proposed to mitigate these environmental impacts. The use of electric vehicles (EVs) for last-mile deliveries is one such solution. According to a European Environment Agency study, electric vehicles have the potential to significantly reduce CO₂ emissions in urban areas. Another option is delivery consolidation, which involves delivering multiple orders to a single location, reducing the number of vehicles required for delivery. Saad and Bahadori (2018) conducted an in-depth examination of last-mile logistics in the context of sustainability, identifying the main challenges, opportunities, and potential solutions. The authors emphasized the importance of adopting innovative delivery models, such as crowd-shipping, bike-sharing, and drone delivery, to reduce the negative environmental and societal impacts of last-mile delivery.

Last-mile logistics can also have significant economic consequences for businesses and consumers. Last-mile delivery costs can account for up to 53% of total delivery costs, according to a McKinsey & Company (2016) study. These expenses can be inflated further by factors such as traffic congestion and parking fees. Furthermore, the desire for faster delivery times and increased convenience may result in higher consumer costs. Collaborative logistics, in which multiple companies share delivery vehicles and routes, could be one potential solution to these problems. E.g., according to Bates et al. (2018), collaborative logistics could reduce delivery costs by up to 40% while reducing greenhouse gas emissions by up to 55%.

Last-mile food logistics can have an impact on the economy of urban areas in both positive and negative ways. On the plus side, it may create jobs for delivery personnel and contribute to the growth of the food industry. On the negative side, increased traffic from delivery vehicles can cause congestion and pollution, which can harm the city's overall economy. Furthermore, the need for faster and more efficient delivery can raise transportation costs for businesses, affecting profitability. On the contrary, last-mile food logistics can help small businesses expand their reach and customer base. The cost of implementing a delivery system, on the other hand, can be a significant investment for small businesses. Furthermore, the requirement for quick and dependable delivery can be difficult for small businesses that may lack the resources to invest in the required technology and infrastructure.

The primary goal of this manuscript is to examine an understudied issue related to last-mile delivery, such as working conditions and social sustainability in the food delivery industry. The rise of gig-economy platforms and precarious forms of employment has raised concerns about delivery workers' fair remuneration and protection (Cantamessa & Grosso, 2020). Siragusa and Tumino (2021) reviewed the environmental, economic, and social impacts of e-commerce in the food sector, emphasizing the importance of improving the working conditions and social sustainability of last-mile delivery workers. According to a report by the International Labor Organization (2020), "delivery workers often face difficult working conditions, including long hours, low pay, and a lack of job security". The reliance on gig economy platforms can exacerbate these issues because workers are frequently classified as independent contractors and do not have access to benefits or protections that employees do.

These working conditions can have a negative impact on social sustainability by increasing inequality and resulting in poor health outcomes for workers. According to a study by Di Lorenzo et al., (2019), "delivery workers face significant health risks due to long hours, heavy workloads, and exposure to environmental pollutants". Furthermore, a lack of job security and benefits can lead to financial insecurity and uncertainty, which can have a negative impact on workers' mental health.

Although methods for studying and mitigating negative externalities associated with economic and environmental sustainability in last-mile food delivery exist, the same cannot be said for social sustainability. Given all of the externalities that last-mile food logistics generate on sustainability, it is critical to investigate consumers' perceptions of these effects, which can greatly influence this sector with their purchasing choices. Several studies have been conducted to address consumers' perceptions and behavior toward sustainable last-mile delivery. In a survey of German consumers' attitudes and preferences toward sustainable last-mile delivery options, Kühn and Kühn (2019) discovered that consumers are willing to pay a premium for more sustainable delivery options. Similarly, a study conducted in the Netherlands by Schulte et al. (2019) discovered that consumers' willingness to pay for sustainable last-mile delivery varies depending on the type of sustainability attribute and the type of product.

The purpose of this manuscript is to broaden the analysis of the sustainability impacts of food delivery, with a particular emphasis on the working conditions of food logistics operators. This study specifically aims to examine consumers' perceptions of the economic, environmental, and, in particular, social sustainability of various food delivery options in the Autonomous Province of Trento (Italy), and how such consumers' awareness may affect food online purchasing behavior and related preferred delivery options.

Geographically, the North-East region of Italy is defined by two main urban centres that attract people from the many peripheral Valleys, as well as a special autonomous statute that grants the local government ample powers of intervention for implementing innovative local policies fostering, among other things, innovative solutions for e-commerce and e-grocery supply chains. In fact, the local government has been very interested in promoting local initiatives aimed at food sustainability, participating in projects with active community participation. E.g., the Autonomous Province of Trento has supported the launch of INDACO, a project to develop a digital platform for e-Commerce and e-Grocery with the goal of enhancing the local production chain of proximity trade.

By selecting such a regional area as the empirical focus of our study, we expect to target, as respondents, consumers with a relatively high awareness of the economic, environmental, and social sustainability of various distribution options.

The current study is structured as follows. Section 2 provides key insights into the research methodology used, with a particular emphasis on sample and survey design. Section 3 provides an overview of the main findings, and Section 4 concludes the study with concrete local policy recommendations for implementing effective and long-term changes in local food supply chains.

2. Methodology

The research method employed in this research involved the procedure for sample construction, developing a 25-items survey, and conducting 385 interviews with computer-assisted telephone interviewing (CATI).

For this study, as shown in Table 1, a quota sample of 385 individuals was extracted from the population, with a confidence level of 95% ($p=0.05$). The quotas were selected based on three main variables: gender (190 females and 195 males), residence area, and age classes (20-29,30-49,50-64, 65-74).

Table 1- The quota sample selected for the case study

<i>Age classes</i>	<i>Adige Valley</i>		<i>Western Valleys</i>		<i>Eastern Valleys</i>	
	Men	Women	Men	Women	Men	Women
20-29 years old	15	14	9	9	8	8
30-49 years old	30	34	18	16	19	19
50-64 years old	29	31	16	13	18	17
65-74 years old	15	12	9	8	9	9

Table 2 shows the sample's main characteristics. The sample in this study was representative of the population's gender distribution, with 50.6% men and 49.4% women being interviewed. In the Autonomous Province of Trento, most households consist of either three or two individuals. The region has a highly educated population, with 84.9% of individuals having obtained at least a high school diploma.

Table 2- Sample characteristics

Gender	Men	Women				
	50.6%	49.4%				
Household composition	1	2	3	4	5	
	10.4%	28.3%	29.1%	28.6%	3.6%	
Educational level	None	Primary license	Middle school	Professional degree	High school	Bachelor, Master, PhD, etc.
	0.8%	0.5%	8.8%	4.9%	70.1%	14.8%

The Province of Trento is characterized by several rural and peripheral areas and two main urban centres that attract citizens from the region. For the purposes of this research, the sixteen areas of the Province of Trento were divided into 3 main macro-areas due to densities and geographical dispersion of population: Adige Valley (which includes the two main urban centres), Western Valleys, and Eastern Valleys.

A 25-item survey (reported in Appendix A) was developed. The questionnaire included 25 questions divided into five parts; the first covers issues on shopping online, the second on food habits, the third on online food purchases and the fourth on preferred delivery options. The final part includes six questions to collect the socio-demographical characteristics of the participants. Data were collected from November to mid-December 2022.

The decision to use the CATI method was based on several previous studies that employed the same methodology. For example, Liu et al. (2017) used CATI to collect data on online food purchasing in China, with the aim of understanding the factors that influence consumers' intentions to purchase food online. Similarly, Tarra et al. (2021) employed CATI to investigate how Solidarity Purchasing Groups have contributed to the resilience of the food supply chain in Rome during the lockdown. Another reason for choosing the CATI method was the results of an online pilot test that was conducted on sixty respondents between May and August 2022. The pilot study had limited participation from elderly people, and since the research aimed to include this age group (65-74 years old), the CATI method was selected over online surveys to avoid the risk of self-selection bias.

3. Results and discussion

This section presents the survey data analysis to understand how socio-economic factors influenced respondents' views on sustainability and delivery options. The study examined how respondents from various socio-economic clusters responded to the survey questions and whether their attitudes differed. By analyzing these results, we can gain a better understanding of the factors that influence individuals' choices regarding food purchasing and delivery, and how they relate to their socio-economic status. We will also investigate whether these factors have an impact on the perception of sustainability and whether they influence preferred delivery options. The findings of this study will be discussed in detail in the following section, offering valuable insights into consumer behavior and its implications for sustainable food systems.

3.1 Assessment of socio-economic variables on consumer sustainability delivery awareness

The survey's main results reveal that the respondents' socio-economic variables and geographical elements are related to a greater or lesser sensitivity to the sustainability of delivery options, as well as the likelihood of making online food purchases. The results show that younger age groups are more willing to buy food online than older ones. In fact, Figure 1 demonstrates that these individuals use the internet more frequently for purchasing products when compared to the sampling trend. Only 13.1% of these individuals have never used the internet for purchasing, while the sampling trend is 32.7%.

Online purchases

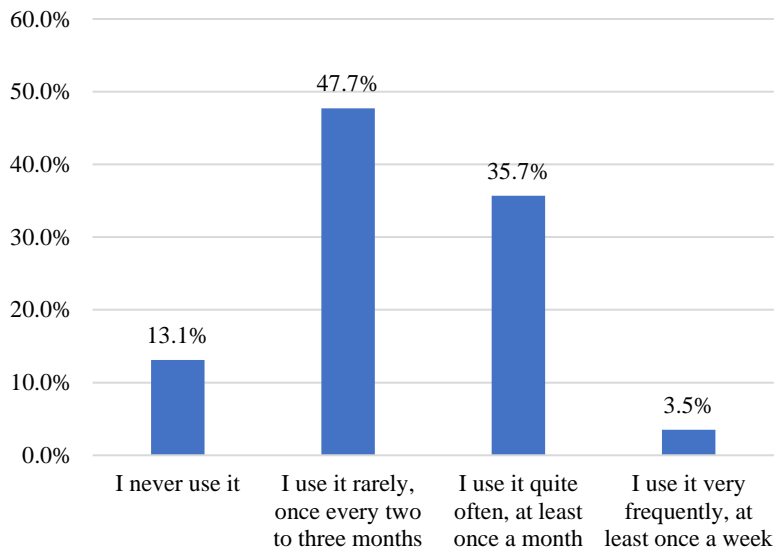
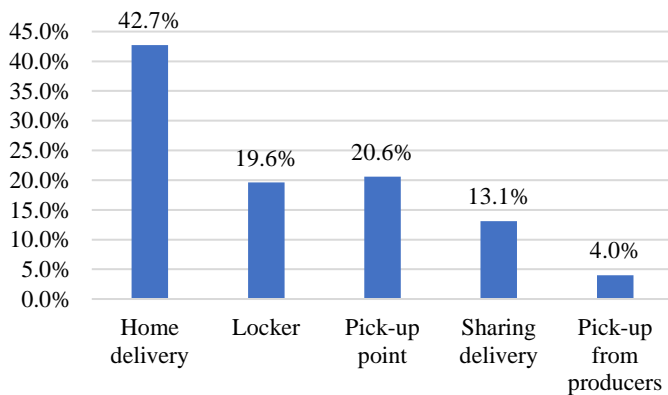


Figure 1- Internet use for online purchases

However, in comparison with younger respondents, the older age groups (50-64 and 65-74 years old) were found to be more inclined towards sustainable delivery methods (Fig. 2).

Preferred delivery option (20-29, 30-49 years old)



Preferred delivery option (50-64, 65-74 years old)

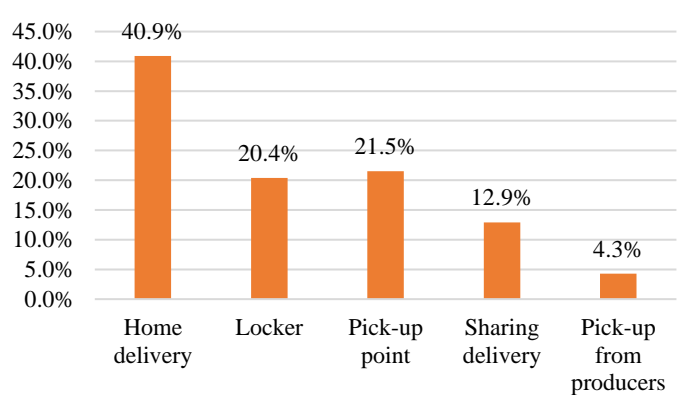


Figure 2- Preferred delivery option of younger group (left) and of older groups (right)

Figure 2 clearly shows that surprisingly, the survey revealed that among respondents who were offered the same shipping cost, a higher percentage of younger participants (42.7%) preferred home delivery, whereas only 57.3% opted for other types of delivery. In contrast, a lower percentage of older participants (40.9%) preferred home delivery, while a majority (59.1%) chose other delivery options. These results are in contrast with the Gomes et al. (2023) and Gazzola et al. (2022) studies, which found that younger generations are generally more sustainable in their lifestyles and consumption choices.

By contrast, concerning the environmental impact of the delivery, the results of the questionnaire reveal that the younger group has a greater awareness of the environmental impact of online delivery compared to the older group, as indicated in Figure 3. Despite this knowledge, younger respondents still prefer home delivery (as indicated in the previous Figure 2), while older individuals, who are less likely to choose this option, perceive it to be the most environmentally friendly choice.

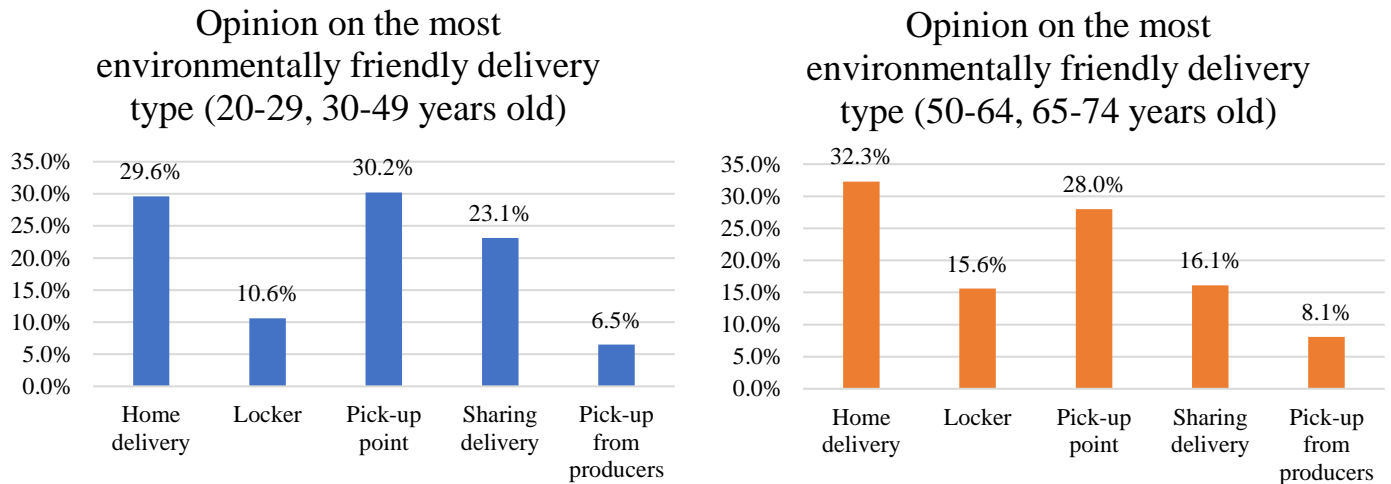


Figure 3- Opinion on the most environmentally friendly delivery option of younger group (left) and older groups (right)

Moreover, individuals with higher levels of formal education are more likely to opt for sustainable delivery options when buying food online. Specifically, only 61.2% of the sample respondents preferred a different delivery method for the same shipping cost than home delivery. Additionally, people with higher levels of education tend to be more aware of the environmental impacts of food delivery, as demonstrated in Figure 4. However, the same group appears to have a lower level of awareness regarding the social impacts of food delivery.

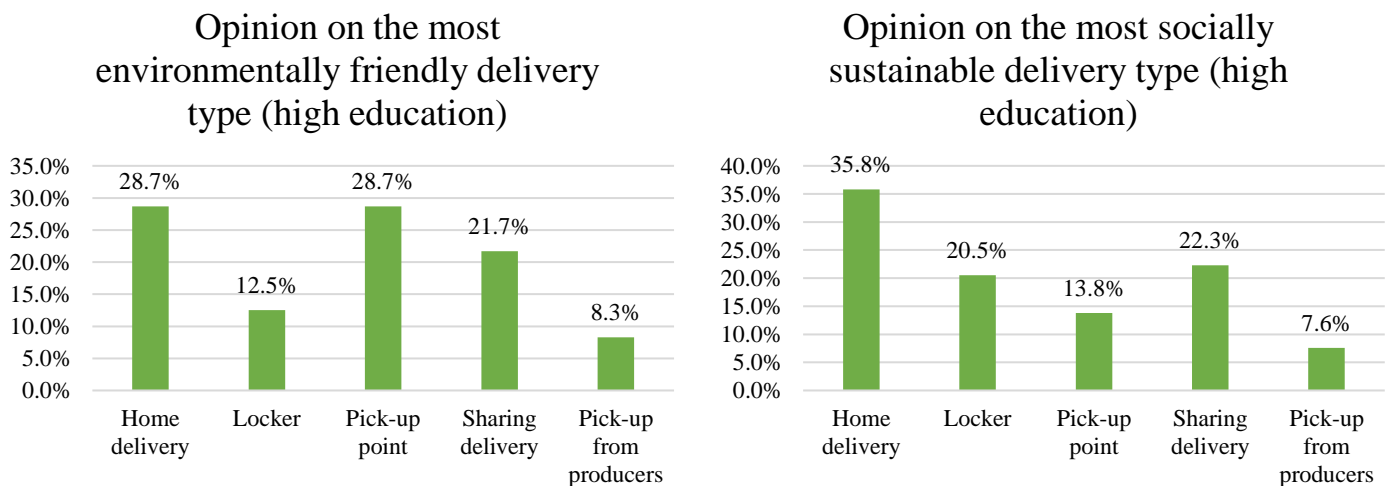


Figure 4- Opinion on the most socially sustainable delivery option of individuals with a high level of education

The analysis of survey responses also provides interesting insights into the preferences of people living in marginal areas, such as the Western and Eastern valleys. Survey responses from individuals residing in these areas show that living in underserved territories may impact their willingness to purchase goods online, owing to the limited availability of services. In fact, the percentage of those who have never bought online is lower, at 30.7%, compared to the sample average of 32.7%.

Furthermore, there is a much higher percentage of those who say they use the Internet to buy something often and very often (30.7 vs. 24.4 sample mean).

The Covid-19 pandemic played a central role in the increase in online food shopping, particularly for those living in urban or central areas compared to those in marginal or underserved areas. As shown in Figure 5, 56.7% of people living in central areas reported an increase in online food purchases due to the pandemic. The increase was lower for those living in marginal areas, with only 42.1% reporting an increase. This difference could be attributed to the limited availability of restaurants offering takeaway options in remote areas, which reduces their likelihood to buy food online despite the pandemic. These findings align with the studies conducted by Maltese et al., (2021) and Güney and Sangün (2021), which suggest that geographic attributes, in addition to the COVID-19 pandemic, also contribute to changes in consumption patterns.

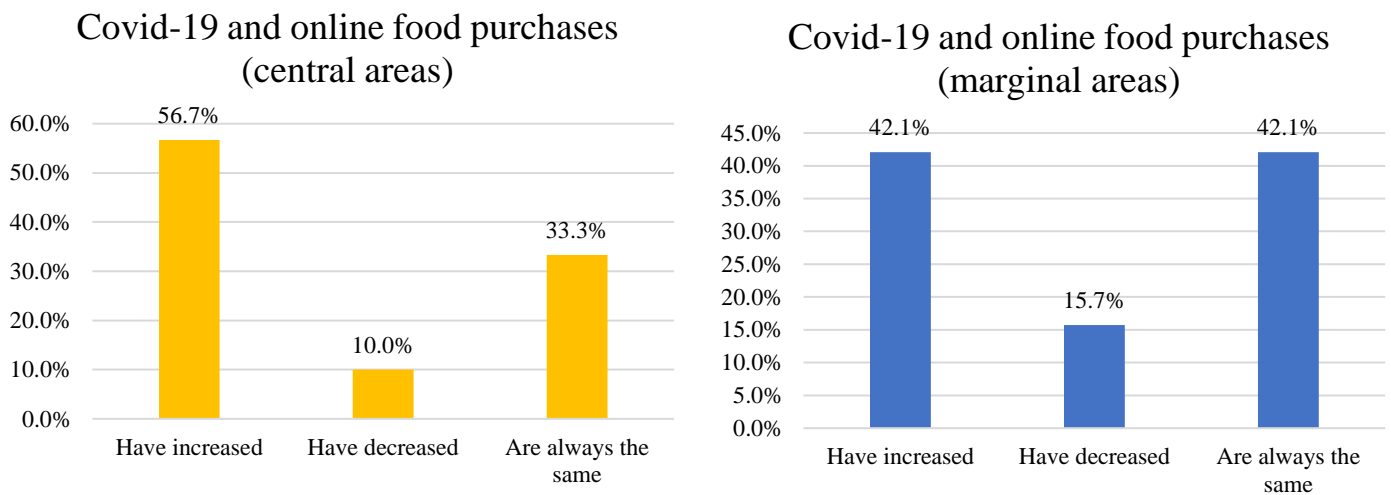


Figure 5- Increase of online food purchases due to Covid-19 in central (left) and marginal area (right)

Moreover, the lack of alternative delivery options in remote areas means that people in those areas tend to prefer home delivery (59.0%), whereas those in central areas prefer pick-up points more often. This difference is likely due to the limited availability of lockers and pick-up points in remote areas, which makes home delivery more convenient for them.

Finally, in contrast to the existing literature, the Covid19 pandemic did not cause a significant increase in e-commerce. However, as demonstrated by Figure 6, the COVID-19 pandemic plays a significant role in the increase of online food purchasing for the total sample.

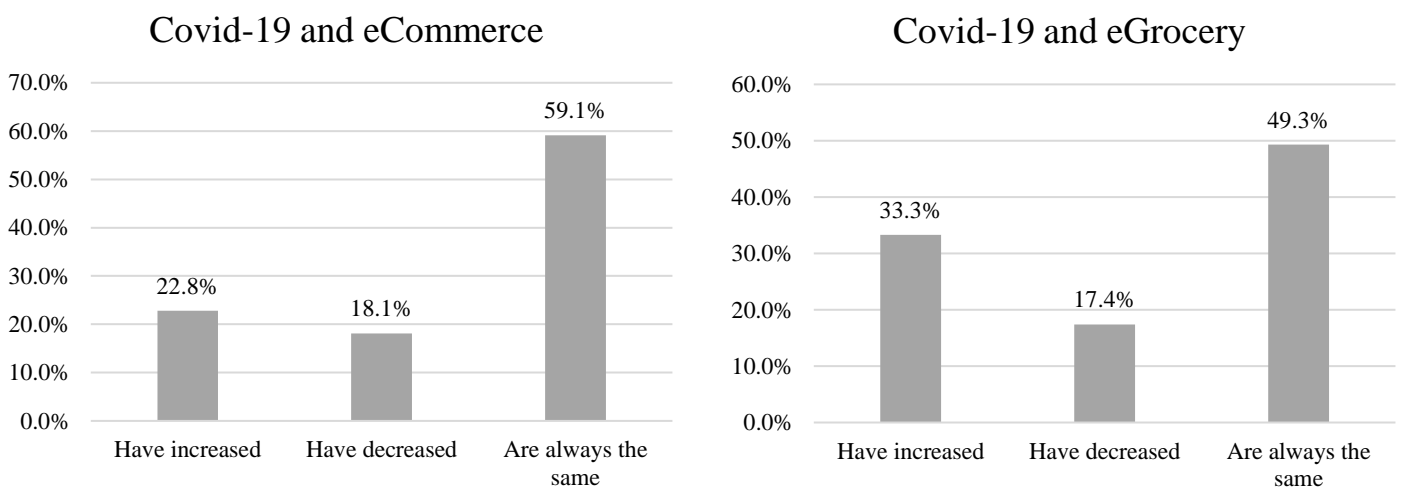


Figure 6- Covid-19 and its effect on e-Commerce (left) and e-grocery (right)

4. Conclusion

This study was able to characterize online food purchasing habits and their associated sustainability awareness in the Province of Trento. The survey, administered via CATI to 385 participants, included several purchasing scenarios and demonstrated that respondents' socioeconomic and geographical variables influence their preferred delivery option and level of sustainability awareness. Data show that geographical attributes, age, and education level, in particular, influence online and food online purchases, as well as consumer perceptions of the sustainability of various delivery options. The main findings of the study suggest that while the Covid-19 pandemic did not contribute to the overall increase in e-Commerce purchases, it did have an impact on online food purchases, particularly in central areas compared to peripheral regions. It appears that Covid-19, coupled with the availability of services, played a significant role in shaping consumer behavior towards online shopping. Additionally, respondents from central areas preferred pick-up points as their delivery option, while those from peripheral areas opted for home delivery due to the limited availability of other options. Lastly, the study revealed a noteworthy correlation between higher levels of education and greater concern for environmental impacts of delivery, rather than social impacts.

Overall, these findings suggest that policies promoting more sustainable local food production and supply systems may need to pay close attention to socio-demographic characteristics of the population in order to estimate their acceptability. However, generalizing these results might be somehow critical if we consider some of the limitations in the design of the research. For instance, one issue might be related to the social-desirability bias among respondents, which we tried to minimize by ensuring the complete anonymity in data collection. Additionally, the study may have been limited by self-selection bias, as only individuals who were interested in the discussed topics agreed to participate in the telephone interview.

Despite these limitations, the evidence gathered appears to suggest a rich agenda for future research. First of all, future research could expand on these findings using correlation analysis to determine which socio-demographic variable most influences consumer perception of the sustainability of delivery options. In addition, more in-depth examination of such topics in empirical surveys with local respondents could yield fruitful use of Discrete Choice Model methodologies to estimate consumers' willingness to pay for and participate in sustainable food last-mile logistics. Comparing Italy with other EU countries could also be useful in analyzing differences in online purchasing behavior and consumer awareness of the sustainability of delivery options. Furthermore, expanding this study to other Italian regions could help policymakers in implementing initiatives for long-term global goals from a consumer and people-centered perspective at the national and regional levels.

The sustainability of last-mile delivery in e-commerce and e-grocery supply chains is a complex and multifaceted issue that requires a comprehensive and interdisciplinary approach. The study's findings have several practical implications for food supply chains' sustainability, emphasizing the importance of adopting innovative delivery models, improving delivery workers' working conditions and social sustainability, and understanding consumers' perceptions and behavior toward sustainable last-mile delivery. This contribution can assist local policymakers in developing successful strategies for strengthening local food production chains and determining a trade-off between consumers' stated preferences and the sustainability attributes of food delivery. This could result in a reduction of the negative externalities of food delivery while also protecting the environment, boosting local economies, and improving the conditions of delivery workers.

References

- Alaimo, L.S., Fiore, M. and Galati, A. (2020) “How the COVID-19 pandemic is changing online food shopping human behaviour in Italy,” *Sustainability*, 12(22), p. 9594. Available at: <https://doi.org/10.3390/su12229594>.
- Bates, O. *et al.* (2018) “Transforming last-mile logistics,” *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* [Preprint]. Available at: <https://doi.org/10.1145/3173574.3174100>.
- Cantamessa, M., & Grosso, M. (2020). The effects of the gig economy on workers' well-being: a conceptual framework. *The International Journal of Human Resource Management*, 31(2), 241-262.
- Di Lorenzo, L., Cappuccio, A., Colonna, G., & De Lucia, G. (2019). Assessment of the work environment, physical exertion, and oxidative stress of package delivery workers. *International journal of environmental research and public health*, 16(6), 973.
- European Commission. (2013). Handbook on sustainable urban mobility measures. Retrieved from
- Gazzola, P. *et al.* (2022) “Italian wine sustainability: New trends in consumer behaviors for the millennial generation,” *British Food Journal*, 124(11), pp. 4103–4121. Available at: <https://doi.org/10.1108/bfj-05-2021-0493>.
- Gomes, S., Lopes, J.M. and Nogueira, S. (2023) “Willingness to pay more for green products: A critical challenge for gen Z,” *Journal of Cleaner Production*, 390, p. 136092. Available at: <https://doi.org/10.1016/j.jclepro.2023.136092>.
- Güney, O.I. and Sangün, L. (2021) “How COVID-19 affects individuals' food consumption behaviour: A consumer survey on attitudes and habits in Turkey,” *British Food Journal*, 123(7), pp. 2307–2320. Available at: <https://doi.org/10.1108/bfj-10-2020-0949>.
- International Labor Organization (2020) *International Organizations*, pp. 171–194. Available at: <https://doi.org/10.1017/9781108888653.007>.
- Kühn, A., & Kühn, R. (2019). A market-based approach for sustainable last-mile delivery: Insights from Germany. *Sustainability*, 11(4), 1182.
- Liao, X., Wong, S. C., Zhu, S., & Yeung, J. H. (2017). Sustainable last-mile logistics in e-commerce: A two-stage network design approach. *Transportation Research Part E: Logistics and Transportation Review*, 98, 82-99.
- Liu, J., Jones, S. J., Sun, H., Probst, Y., & Nkansah, N. (2017). Consumer behavior and health implications of dairy products in China: an application of the theory of planned behavior. *Appetite*, 108, 105-113.
- Maltese, I. *et al.* (2021) “Grocery or @grocery: A stated preference investigation in Rome and Milan,” *Research in Transportation Economics*, 87, p. 101096. Available at: <https://doi.org/10.1016/j.retrec.2021.101096>.

- McKinsey & Company. (2016). Parcel delivery: The future of last mile.
- Nakano, S. (2022) "Factors influencing consumers' online grocery shopping under the new normal," *Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing*, pp. 59–75. Available at: https://doi.org/10.1007/978-3-031-19604-1_5.
- Osservatori.net (2020). Come il lockdown ha accelerato il processo di digitalizzazione e aumentato gli acquisti online del comparto food and grocery.-- www.osservatori.net/en/home.
- Polenzani, B. and Marchini, A. (2022) "Does the COVID-19 affect food consumption patterns? A transaction cost perspective," *Economia agro-alimentare*, (2), pp. 1–28. Available at: <https://doi.org/10.3280/ecag2022oa13161>.
- Saad, S.M. and Bahadori, R. (2018) "Sustainability evaluation of last mile food delivery: Pick up point using lockers versus home delivery," *Proceedings of the 4th International Food Operations and Processing Simulation Workshop (FoodOPS 2018) [Preprint]*. Available at: <https://doi.org/10.46354/i3m.2018.foodops.005>.
- Saphores, J.-D., Xu, L. and Park, B. (2022) "Covid-19 and Food Shopping: Results from California and comparisons with China and South Korea," *Springer Tracts on Transportation and Traffic*, pp. 95–111. Available at: https://doi.org/10.1007/978-3-031-00148-2_7.
- Schulte, M. J., Stieger, D., Gassmann, O., & Beck, M. (2019). Willingness to pay for sustainable last-mile delivery options: A contingent valuation study. *Transportation Research Part D: Transport*
- Seghezzi, A. and Mangiaracina, R. (2021) "Investigating multi-parcel crowdsourcing logistics for B2C e-commerce last-mile deliveries," *International Journal of Logistics Research and Applications*, 25(3), pp. 260–277. Available at: <https://doi.org/10.1080/13675567.2021.1882411>.
- Shang, D. and Wu, W. (2017) "Understanding Mobile shopping consumers' continuance intention," *Industrial Management & Data Systems*, 117(1), pp. 213–227. Available at: <https://doi.org/10.1108/imds-02-2016-0052>.
- Siragusa, C. and Tumino, A. (2021) "E-grocery: Comparing the environmental impacts of the online and offline purchasing processes," *International Journal of Logistics Research and Applications*, 25(8), pp. 1164–1190. Available at: <https://doi.org/10.1080/13675567.2021.1892041>.
- Tarra, S., Mazzocchi, G. and Marino, D. (2021) "Food system resilience during COVID-19 pandemic: The case of roman solidarity purchasing groups," *Agriculture*, 11(2), p. 156. Available at: <https://doi.org/10.3390/agriculture11020156>.
- UC Davis Institute of Transportation Studies. (2018). Electrifying the last mile: Understanding the opportunities and challenges of electric delivery vehicles. Retrieved from
- World Economic Forum. (2020). The future of last-mile delivery: Reducing greenhouse gas emissions from urban logistics.

Appendices

Appendix A. 25-item survey

<h2>Questions</h2>	
<h3>1) SECTION "SHOPPING ONLINE"</h3>	
1.	Are you domiciled in the Autonomous Province of Trento?
2.	Please indicate your area of residence from the following options:
3.	Please indicate how often you use internet to buy something: <ul style="list-style-type: none">- I never use it- I use it rarely, once every two to three times por month- I use it quite often, at least once a month- I use it very frequently, at least once a week
3.1.	Of the following statements, please indicate the main reason why you do not shop online: <ul style="list-style-type: none">- I prefer to choose the products in person- Because I want to support local shops- Because the delivery options offered by the various sites are uncomfortable for me- Because buying online is not a reliable method- I do not have digital skills- I do not have access to the net- Other (please specify the reason)
4.	With the covid-19 pandemic your online purchases: <ul style="list-style-type: none">- Have increased- Have decreased- Are still the same
5.	Please indicate the type of goods and services you buy most online: <ul style="list-style-type: none">- Services (insurance, banking, etc.)- Travel- Technological products (mobile phones, household appliances, computers, tablets, etc.)- Clothing and footwear- Personal care products and over-the-counter medicines- Animal products- Childcare products- Household products- Books and journals- Food products- Other:___ (indicate what)
6.	Please indicate how much you spend on average per month on your online purchases: <ul style="list-style-type: none">- Less than 10 euro- From 11 to 20 euro- From 21 to 50 euro- From 51 to 100 euro- From 101 to 300 euros- More than 500 euros per month
<h3>2) SECTION "FOOD"</h3>	
7.	You generally shop for food: <ul style="list-style-type: none">- Exclusively for yourself- For yourself and your cohabitants- Do not shop

<p>8. On average, considering your household, how much do you spend per week on groceries?</p> <ul style="list-style-type: none"> - Less than 50 euro - From 50 to less than 100 euro - 100 to less than 150 euro - From 150 to less than 200 euros - More than 200 euros
<p>9. When shopping for food products, what criteria guide your purchases? For each statement please express the level of importance on a scale from 1 to 5, where 1 indicates not at all important and 5 indicates very important:</p> <ul style="list-style-type: none"> - Mode of production (organic, biodynamic etc.) - Direct support to local producers - Legality and respect for the rights of workers in the agri-food chain - Sustainability of production (waste/excess management/reusable/compostable packaging etc.) - Food price - Discounts on food
<p>10. Assuming you buy courgettes (or an equivalent product) at 1 euro per kg, how much would the quantity you buy vary if the price were reduced from 1 euro to 0.5 euro per kg?</p> <ul style="list-style-type: none"> - It would increase - It would stay the same - It would decrease
<p>3) SECTION "BUYING FOOD ONLINE"</p>
<p>11. Do you generally buy food online (including online shopping, or orders on Just Eat, Glovo, Deliveroo etc.):</p> <ul style="list-style-type: none"> - Never - Approximately once per month - Two to three times per month - Approximately once a week - Several times a week
<p>11.1 Of the following statements, please indicate the main reason why you do not buy food online:</p> <ul style="list-style-type: none"> - Because you want to choose products in person - Because you like shopping - Because you want to compare prices in real-time - Because the delivery options offered by the various sites are inconvenient for you - Does not have the digital skills or access to the internet - Other (specify the reason)
<p>12. With the covid-19 pandemic your online food purchases</p> <ul style="list-style-type: none"> - Have increased - Have decreased - Are still the same
<p>13. What type of food do you mainly buy online?</p> <ul style="list-style-type: none"> - Home delivery of ready-cooked meals (from restaurants, fast food outlets, etc.) - Products that I generally cannot find in my region - Fresh products (dairy products, cheese, etc.) - Organic and/or km 0 products from my region - Frozen products (fish, ready meals) - Products that you buy in large quantities and save money (e.g. olive oil bought directly at the mill, etc.) - Children's products - Canned products (flour, pasta, biscuits, tea/tea, etc.) - Other (indicate what)
<p>4) SECTION "DELIVERY METHODS"</p>

<p>14. Imagine you are placing an online food order of 80 euro, indicate how much more you would be willing to pay (from 0 euro to 3 euro) if you were told that:</p> <ul style="list-style-type: none"> - That the working conditions of the delivery person are decent - The products you buy are transported by electric vehicles - The manufacturer does not discriminate against its employees (e.g. on the basis of sexual orientation, religious affiliation, nationality, etc.) - CO2 emissions caused by transport are offset by other activities in support of the environment (reforestation, investment in climate protection projects, etc.). - The transport company pursues gender-related objectives in its corporate policies (non-discrimination in the workplace, pay equity, similar employment rates between men and women, etc.). - Means of transporting food optimise their loading capacity by organising deliveries and the route to be taken (avoiding travelling empty and travelling the same route several times, etc.). - Delivery on the day of purchase or as soon as possible
<p>15. Imagine you have purchased a food product online, choose the delivery option you prefer for the same shipping cost:</p> <ul style="list-style-type: none"> - Home - Collection of the parcel at a public delivery point (locker or parcel box) - Pick-up at a local shop (pick-up point) - Delivery by a sharing delivery service (delivery by private individuals who would still have to travel the delivery route) - Collection by you directly from the producer
<p>16. Of the following, which aspect should be improved in the food delivery service?</p> <ul style="list-style-type: none"> - Efficiency of the service (traceability, possibility to contact the producer/seller directly, faster delivery times etc.). - Saving of material used for packaging (adhesive tape, inner plastic, etc.) and fully recyclable packaging - Respect for the rights of delivery workers and sharing this information with consumers - Use of local labour for the delivery service - Choice of delivery method for the products they order (home, pick-up point, etc.) - None of the above options - Other (specify what)
<p>17. Imagine that you buy a food product online and that you can choose the delivery method that is most convenient for you. How much do you think the delivery method has an impact on the following categories? Please indicate your level of agreement with the following statements on a scale from 1 to 5, where 1 not at all agree 5 very much agree:</p> <ul style="list-style-type: none"> - The type of delivery I choose has an impact on the health of the delivery workers - The type of delivery I choose has an impact on the air quality of the city where I live - The type of delivery I choose can favour the re-employment of disadvantaged groups - The type of delivery I choose has an impact on the local economy where I live - The type of delivery I choose has an impact on global climate change
<p>18. Please indicate which type of delivery you think is the most environmentally sustainable:</p> <ul style="list-style-type: none"> - Home delivery - Delivery to a local shop, with customer collection - Customer collection from producer - Sharing delivery (delivery by private individuals who would still have to travel the delivery route) - Collection by customer at a locker/package box
<p>19. Please indicate which delivery option is in your opinion the most socially sustainable for workers in the transport sector (health of workers, number of working hours, ergonomics, etc.):</p> <ul style="list-style-type: none"> - Home delivery - Delivery to a local shop, with customer collection

<ul style="list-style-type: none"> - Customer collection from producer - Sharing delivery (delivery by private individuals who would still have to travel the delivery route) - Pick-up by customer at a locker/package box
4) SECTION "DEMOGRAPHIC VARIABLES"
<p>20. Gender:</p> <ul style="list-style-type: none"> - Female - Male - Prefer not to answer
<p>21. Please indicate your educational level:</p> <ul style="list-style-type: none"> - I have no educational qualification - Primary school certificate - Secondary school certificate - Professional qualification - High school diploma - University degree, master's degree, PhD
<p>22. Please indicate your age:_____</p>
<p>23. How many people currently live in your household? (please also consider yourself, if you live alone the answer is 1):_____</p>
<p>24. Can you indicate which class your net monthly income falls into?</p> <ul style="list-style-type: none"> - No income - Less than 800 euros per month - Between 800 and 1000 euros per month - Between 1001 and 1500 euros per month - Between 1501 and 2000 euros per month - Between 2001 and 2500 euros per month - Between 2501 and 3000 euros per month - Over 3000 euros monthly - I prefer not to answer
<p>25. (Optional) If you want to add something, this section is dedicated to your comments. Please feel free to leave feedback on the questionnaire. Thank you for your participation</p>