CONSUMERS' REAL-TIME DECISION-MAKING ON DELIVERY OPTIONS

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List of abbreviations and acronyms

Acronym	Meaning
ASTER	Alliance for Sustainable E-commerce, Lindholmen Science Park
BE	Belgium, e.g. BE1 refers to participant based in Belgium
Click+Collect	Delivery option involving consumer collecting item from one of the online seller's physical stores.
IT	Italy, e.g. IT1 refers to participant 1 based in Italy
NL	Netherlands, e.g. NL1 refers to participant 1 based in Netherlands
NO	Norway, e.g. NO1 referes to participant 1 based in Norway
SODE	Magma Srl Impresa Sociale
TNO	Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek
TOI	Transportøkonomisk Institutt, Norwegian Center for Transport Research
TRT	TRT Trasporti e Territorio Srl
VUB	Vrije Universiteit Brussel

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Copyright Statement

Abstract

This Deliverable aims to understand how online consumers choose delivery options in authentic online ordering situations. The motivation is to provide a basis for communications that can increase consumer demand for sustainable delivery options.

Authentic delivery choices were studied using retrospective interviews and simulated delivery choices with 22 consumers from Norway, Italy, Belgium and the Netherlands. The findings suggest that consumers recognize familiar features when making online delivery choices, and that recognition allows them to efficiently choose a single delivery option for evaluation.

Rather than systematically comparing several delivery options on a set of criteria, consumers appear to carry out “singular evaluations” by envisaging how a single delivery option would work for them if they were to combine it with one of their personal collection strategies.

The purpose of evaluation is to assess the convenience of the delivery-collection option in relation to its cost. Speed, safety and occasionally sustainability are secondary goals in the evaluation of delivery-collection options.

Negative delivery experiences are associated with the physical delivery phase rather than the online platform, but the latter can still hinder consumer choice of delivery option in several ways.

The study suggests that sustainability plays a very limited role in online choice of delivery option by today’s consumer. Challenges in the physical and digital delivery ecosystem that should be addressed to promote consumer choice of sustainable delivery option are identified.

This deliverable is to be approved by the European Commission

Executive Summary

The rapid growth in e-commerce has reshaped consumer habits offering unparalleled convenience but also introducing pressing societal challenges. With delivery rates rising rapidly, the environmental burden—manifested in increased pollution, greenhouse gas emissions, and congestion—is escalating. These impacts extend beyond environmental concerns to include threats to public health, such as rising noise levels, traffic stress, and safety risks. CodeZERO aims to help address these challenges by co-creating sustainable and zero-emission last-mile delivery and return solutions for e-commerce that align with consumers' preferences while being sustainable for retailers, logistics operators and local authorities. The project intends to provide communication guidelines to engage consumers and tools for the promotion of sustainable delivery and return options by local authorities.

Improving the sustainability of last-mile logistics requires not only that improved delivery solutions are supplied, but that consumers demand them. Existing studies, however, suggest that improving consumers' sustainability knowledge, awareness and attitudes does not always result in increased consumer demand for sustainable options. While eco-labelling, default-setting and other "nudges" can increase the extent to which consumers choose sustainable delivery options, an optimal increase in consumer demand for sustainable delivery will only be achieved by knowing how to align consumer awareness and attitudes with delivery choices made in everyday life. Such an alignment requires first understanding how consumers make online delivery choices in dynamic real-world contexts, when multiple goals need to be considered alongside sustainability, and when consumer decisions can be more instinctive than rational.

The ultimate aim of the study presented in this Deliverable is to help building knowledge of how retailer communication on sustainable delivery choices should be aligned with consumer delivery choices made in real-world contexts. Building on research in the field of naturalistic decision-making, the study specifically seeks to understand how consumers make delivery decisions in authentic online ordering situations, how those decisions are facilitated or hindered by the online platform interface, and how sustainability can be better accounted for.

This understanding was developed based on interviews with 22 consumers living in or around Brussels, Belgium; Milan and Modena, Italy; The Hague and Groningen, Netherlands; and Oslo, Norway. Each interview comprised two parts: i) Retrospective cognitive task analysis about real-world incidents and experiences; and ii) "Think-aloud" exercises in which participants described what they were thinking and noticing while using popular online shopping platforms. Each interview was recorded, transcribed, coded and analysed.

Delivery choices have unique contexts

The findings suggest that consumers vary in their shopping strategies, in their physical and digital environments, and in their mental models of how delivery choice fits in as part of the online shopping process. These factors interact to form unique real-world contexts that could contribute to an attitude-behaviour disconnect, and which could therefore be important to consider when attempting to influence delivery choice by online consumers.

Consumers evaluate "delivery-collection" options

Delivery choices appear to be primed by consumers' recognition of familiar online choice situations. Recognition by participants in this study seemed to trigger a set of expectations and cues to attend to, as well as goals for evaluation of delivery options. Rather than systematically comparing delivery options on a set of criteria (comparative evaluation), participants seemed to assess one option at a time (singular evaluation). Participants often evaluated a single delivery option by tying it to a personal collection strategy, envisaging future events to see if the delivery-collection option would work to satisfy their goals. If it seemed to work as part of a delivery-collection scenario, participants would tend to select the online delivery option presented. If it didn't seem to work, they could modify their choice of delivery option, or the collection strategy used.

Cost and convenience were prioritized when subjecting delivery-collection options to singular evaluation. Participants' ability to control the time, precision and location of the delivery appeared to be key to satisfaction with the presented delivery option and the delivery-collection scenario it suggested.

Speed and safety were also considered as participants deliberated delivery-collection options. Only a few participants considered sustainability, and only then if it did not mean sacrificing cost or convenience.

Consumers recognize familiar features of choice situations

On recognizing a delivery choice situation, participants seemed to seek or react to situational features or "cues" that helped them make sense of the delivery choice. Main cues were delivery price, preferred delivery method, preferred pick-up point/location, delivery time slots, package dimensions, return information, payment icons, courier icons, and eco-labels.

Recognition also triggered expectations, both about the online delivery situation and ensuing physical delivery. Expectations seemed to help participants efficiently comprehend the delivery choice before them. Where information presented by the platform did not align with their expectations, participants seemed to seek clarification, generating reasons for misalignment using pre-existing knowledge or real-world experience. Platforms that fail to align with consumer expectations can be experienced as clumsy or difficult to use.

Bad delivery experiences can influence future delivery choices

Once delivery-collection options are evaluated and chosen, consumers experience the consequences of delivery choices in terms of physical delivery of the item(s) ordered. This then affects how they recognize and make sense of future delivery choice situations. Participants in the study experienced more "bad" delivery experiences in the physical delivery phase than during online delivery choice. These were related to delivery time, communication during delivery, delivery location, returns, carrier behaviour, the package, and customer control during the delivery phase. These challenges could contribute to an attitude-behaviour disconnect and should therefore be addressed in the development of sustainable delivery options and related communications.

Role of interface in delivery choice

Although participants did not recognize use of the digital interface as a difficult step in delivery, the following barriers should be addressed by retailers wanting to improve the usability and usefulness of their delivery choice interface:

- Poor transparency of location of purchased products, new delivery options, costing of time slots, delivery costs, and returns processes.
- Forced choice of express delivery, inconvenient pick-up points, unreliable or "unsafe" carriers, or expensive delivery options.
- Confusing presentation of delivery options caused by lack of standardization, distracting information, non-intuitive or "wordy" interface design.
- Missing, inaccurate or hard-to-use information content.
- Process barriers, such as forced to choose delivery too late or early in the online shopping process.

In seeking to address these barriers and designing improved delivery interfaces, retailers can look to product choice interfaces. Several participants preferred these for their use of pictures and filters. Though not a focus of the current study, participants expressed frustrations with carrier apps used after the order had been made. This concerned lack of standardization and having to register several times for different carrier apps. Carrier apps were a main source of loss of control experienced by participants during the delivery phase.

Choosing sustainable delivery options

The findings suggest that sustainability plays only a very minor role in current online delivery choices: study participants did not prioritize sustainability when choosing delivery and it was not visible in most of the delivery options presented by the 12 platforms used in the think-aloud exercises. Participants were largely unaware of the diversity of challenges that online delivery presents to society. When asked to choose what they thought was the most sustainable delivery option, participants were left to guess at the relative sustainability of the different options. Although several participants recognized home delivery, narrow time slots and express delivery as less sustainable options, they were unsure about

this. After choosing a sustainable delivery option, several participants volunteered that they would not choose that option in real-world situations, because it was too expensive or inconvenient. In seeking to increase consumer demand for sustainable delivery, retailers can consider the above findings on interface design alongside the following specific barriers to choosing sustainable delivery options:

1. Lack of transparency on sustainability of different delivery options. Most of the cues presented by online platforms address convenience and costs, with few cues indicating the relative sustainability of different options, type of vehicles or energy sources used in delivery, the start location of the product or the distance it would need to be transported. This left participants uncertain about relative sustainability of different options.
2. Sustainability depends on several factors, such as the carrier logistics, transport forms used by consumers and relative distribution of consumer choices. This not only makes it difficult for users to rank delivery options on sustainability using pre-existing knowledge, but for retailers to present meaningful sustainability information.
3. Online platforms market affordability and convenience of delivery at the expense of sustainability. Examples of this include “one-click” ordering, free returns in exchange for membership commitments, or “order by midnight, get it delivered tomorrow”.
4. Delivery choice is often the last step in ordering, when consumers are keen to complete the ordering process quickly and therefore choose more instinctively.
5. Lack of understanding and trust of eco-labels, partly due to inconsistent messaging by different retailers.

Enablers to sustainable choice of delivery options apparent in participant responses should also be considered.

Addressing the attitude-behaviour disconnect

In the think-aloud exercises participants were asked to choose delivery options as they normally would as if they were in an authentic ordering situation. On discussing sustainability after this choice had been made, most participants became aware of their own attitude-behaviour disconnect. They seemed to realise spontaneously that they had not chosen delivery options in line with their sustainability values. Addressing barriers to delivery choice and aligning the presentation of sustainability information with the way consumers make decisions could reduce this disconnect and lead to more sustainable consumer choices.

One way to do this is to consider how consumers make sense of delivery options in terms of their personal collection strategies and how these then align with prioritized goals. Communication on the sustainability and convenience of different collection strategies that consumers use to construct sustainable delivery-collection options – as well as on the sustainability of delivery options themselves – would help consumers evaluate delivery-collection options and potentially lead to increased demand for sustainable delivery. To better account for contextual factors, which could also explain the awareness/attitude-behaviour disconnect, research is needed to understand ways in which shopping strategies and physical surroundings cluster to create different sorts of contexts influencing online delivery choice. Demand for sustainable delivery options could also be improved by addressing the loss of control that consumers can experience during physical delivery as well as clarifying the sustainability of delivery-collection choices via the delivery interface.

Consumer personas

Ways in which different types of physical surroundings affect collection strategies should also be considered when developing personas for the targeting of behavioural change strategies. This Deliverable also provides examples of different collection strategies and consumer sustainability awareness profiles that could be used to develop personas. Consumers’ prioritization of cost vs. convenience can also be considered, as well as their shopping strategy, frequency of online shopping, marketing susceptibility and suitability of workplace as a location for delivery or return.

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1 Introduction

1.1 About CodeZERO

CodeZERO is a three-year Horizon Europe research project aiming to co-create **sustainable and zero-emission last-mile delivery and return solutions for ecommerce** that align with **consumers'** preferences while being sustainable for **retailers, logistics operators** and **local authorities**. Additionally, the project is focused on providing clear, consumer-friendly communication and developing tools for local authorities to promote eco-friendly behaviour.

CodeZERO is articulated in four phases:

- An **ANALYSIS** phase which provides (1) an analysis of existing delivery and return options and an understanding of how they are shaped by the needs and constraints of all involved stakeholders; (2) an in-depth intersectional analysis of various groups of on-line consumers to understand what are the features of delivery and return options making them attractive, with the aim to identify mechanisms to incentivize behaviour changes; and (3) an assessment framework to measure the impacts in the environmental, economic and social domains of new solutions.
- A **DESIGN** phase, in which CodeZERO engages in a co-design process involving retailers, transport operators, consumers and local authorities in developing (1) guidelines for retailers to raise awareness among consumers; (2) a set of zero-emission and sustainable delivery and return options for retailers and transport operators; and (3) a toolset for local authorities to accelerate the transition towards sustainable solutions in last mile consignments in e-commerce.
- A **TEST** phase running four pilots in four different European cities in Italy, Netherlands, Belgium, and Norway to test a set of sustainable solutions identified in the previous phase with the aim to prove their feasibility, to fine-tune their design and to assess their impacts from the perspective of all stakeholders.
- A **CONSOLIDATION** phase where (1) CodeZERO outcomes are fine-tuned based on the lessons learned from real life applications, (2) requirements for up-scaling of solutions at European level are discussed (3) recommendations are formulated and (4) directions for future research are outlined.

Engagement with consumers and retailers' associations, industry stakeholders, cities and researchers contributes to shaping project results.

Running from June 2024 to May 2027, CodeZERO is organized along eight WPs:

- WP1 Analysis of current delivery models
- WP2 Analysis of consumers' behaviour
- WP3 CodeZERO assessment framework
- WP4 Design of CodeZERO solutions
- WP5 Testing solutions: CodeZERO living labs
- WP6 Conclusions and recommendations
- WP7 Dissemination, communication and exploitation
- WP8 Project management.

1.2 Context and aim of this deliverable

This Deliverable is an output of WP2, which aims to understand consumer behavior and how it can be influenced by the delivery solutions and communication guidelines developed in CodeZERO. WP2 has four objectives:

1. Identify a range of consumer groups suited to different behavioral change strategies.
2. Understand life-context factors shaping consumer choice of delivery/return option.
3. Understand factors influencing consumers' real-time decisions on delivery/return options.
4. Investigate the circumstances in which online consumers are willing and motivated to trade their preferred delivery option with more sustainable alternatives.

The focus of this Deliverable is objective 3. It aims to understand:

- how consumers make decisions about online delivery in real-life ordering situations;
- goals and constraints affecting the delivery choices of online consumers;
- delivery information that consumers need from the online platform;
- how information should be presented to increase the transparency of delivery choice;
- how to influence consumers so that they choose sustainable delivery options.

Together with Deliverables 1.1, 2.1, 2.2, and 2.5, Deliverable 2.3 will provide input for the development of indicators to assess consumers' behavioural change in Deliverable 3.2, and for the preparation of preliminary communication guidelines in Deliverable 4.3. These deliverables together will give a comprehensive understanding of factors influencing consumer choice of delivery and return options:

- Deliverable 1.1 (Fiorello et al., 2024) describes that the cost, time, location, information, reliability and flexibility of delivery will influence consumer choice of delivery option together with factors such as product type and physical surroundings.
- Deliverable 2.2 (Pernot et al., 2025) describes how life context influences delivery choice. It finds that consumers have only a partial understanding of the effects of delivery on social, environmental or other forms of sustainability. Increased awareness of sustainability could cause consumers to choose more sustainable options, but only if it is aligned with pro-sustainability values and does not reduce affordability or convenience substantially.
- Deliverables 2.1 and 2.5 will group consumers according to constraints and preferences to be accounted for when attempting to change how they choose delivery or return options.

1.3 Structure of this deliverable

The next chapter sets out why influencing consumers to choose sustainable delivery is a problem worth solving, and why solutions must account for the real-world contexts of consumers. After describing the methodology in Chapter 3, the findings are presented in four parts:

- the context of real-world delivery choices (Chapter 4)
- how online consumers decide which delivery option to take (Chapter 5)
- the role of the online interface in consumer choice of delivery options (Chapter 6)
- factors affecting the choice of sustainable delivery options (Chapter 7)

Finally, Chapter 8 describes implications that the findings have for those looking to get consumers to choose sustainable delivery options.

2 Problem and approach

2.1 The need to understand and influence consumer choice of delivery options

The EU and UN have ambitious social, environmental and health sustainability goals for 2030 and beyond[1]. One of the key areas to address in achieving these goals is the sustainability of road transport, which remains a major source of air and noise pollution (EEA, 2024). Tackling economic, social and environmental sustainability challenges in road freight transport will be critical as freight transport activity reached an all-time high in 2022 (EEA, 2024). The rapidly growing number of smaller, dispersed last-mile freight deliveries driven by e-commerce are especially concerning, since they are disproportionately expensive and inefficient and have a greater social and environmental impact (Bosona, 2020).

E-commerce sales tripled globally from 2014 to 2019 due to increasing urbanization, advancing technology, increasing access to global products, and a rapidly expanding B2C/direct-to-customer market (World Economic Forum, 2020; Kokkinou et al., 2024). E-commerce suppliers have competed for customers by giving them omnichannel access to an increased range of products, delivered cheaply, quickly and flexibly (Amorim et al., 2024)[2]. Flexibility gives consumers greater control over the timing and location of their delivery. To achieve this, sellers work with carriers to increase the range of delivery options, e.g. home delivery with time slots, pick-up from parcel lockers / staffed service counters or “Click+Collect” from the supplier’s physical store. Pick-up options are being touted as more economically and environmentally sustainable, because they allow retailers to consolidate deliveries and reduce the number of delivery failures. Their popularity and sustainability depend on the cooperation and transport mode choices of the consumer.

Given the power of consumer demand as a driver of supply in a free market, an effective way to increase the sustainability of last-mile deliveries is to get consumers to choose the most sustainable delivery options. It has been estimated that getting half of the consumers to choose pick-up instead of home delivery could mean a 33% reduction in CO2 emissions (Davydenko and Hopman, 2020). The challenge is that consumers demand delivery options that are inexpensive and convenient (Kokkinou, 2024; Pernot et al., 2025). This suggests that sustainable delivery options that compete with conventional options on affordability and convenience should be developed (e.g. Collins, 2015; see also D1.1) and consumers should be influenced to choose sustainable options (Fiorello et al., 2024). The current Deliverable contributes to the latter by increasing understanding of how online consumers choose delivery options and what influences their choice.

2.2 Existing research

Online consumers’ choice of delivery options is known to correlate with their motivations for shopping (e.g. whether shopping is for fun or a necessary chore) and the type of product they want delivered (e.g., Miquel-Romero, 2018; Caspersen, 2022). Existing research looking at how to get consumers to choose more sustainable delivery options has been focused in two areas:

1. How to change consumer knowledge, awareness and attitudes to motivate them to choose sustainable delivery options (e.g., Rausch et al., 2021).
2. How to influence consumer choice of sustainable delivery options by altering the **content** and **presentation** of delivery option attributes on online platforms.

Research on the **content** of delivery options suggests consumers may be unwilling to pay extra for sustainable delivery options and that satisfaction decreases if they are forced to pay more for choosing less sustainable options (Tokar, 2020; Kokkinou, 2024). Eco-labelling of options to indicate which are most sustainable can motivate those consumers who trust the information to choose sustainable options (e.g. Behavioural Insights Team, 2024; Szabo and Webster, 2021).

[1] https://sdgs.un.org/goals
[2] Precision refers to length of time slots for home delivery; timing refers to the availability of choices across the week.

Research on the **presentation** of information includes the use of behavioural economics to understand how small changes to the content or presentation of information ("nudges") can influence online consumer choice. While most work has been on product choice (e.g. Ytreberg et al., 2023; Valencic, 2023, Gossen et al., 2022) work on delivery choice is also emerging, suggesting that making sustainable delivery a default option or making consumers "opt out" of sustainable options increases sustainable choices (Agatz et al., 2020; Muysoms et al., 2021; Nijssen et al., 2023; Theotolia and Manganari, 2025).

2.3 Attitude-behaviour disconnect

Consumers who are aware of sustainability issues and intend to choose sustainable options, often choose non-sustainable options in real-world situations (Nielsen et al., 2022). This disconnect between attitude and behaviour is a challenge if it means communication to increase consumer knowledge or awareness having little effect on real-world consumer choice. While nudging or changing the "choice architecture" of online platforms can circumvent this challenge, optimal gains require understanding and addressing the disconnect so that attitudes and behaviour can be aligned (Panzone et al., 2021).

The attitude-behaviour disconnect has been explained in terms of consumers making decisions deliberately/rationally or intuitively/spontaneously (Kahneman, 2013; Bellini-Leite, 2022; Nijssen et al., 2023). When thinking more deliberately and rationally, consumers may value sustainability but prioritize cost, convenience or other valued goals; and when thinking more instinctively the "new" sustainability values of consumers may not factor into automated actions built on "old" values (Young et al., 2010). This explanation aligns well with observations that the attitude-behaviour gap becomes most apparent when research moves outside the world of experiments and surveys into real life, where consumers have multiple goals and constraints and decide more instinctively. It implies that there is a need to understand how consumers make decisions in real-world situations to account for the attitude-behaviour disconnect and design optimal behavioural change measures (Nijssen et al., 2023).

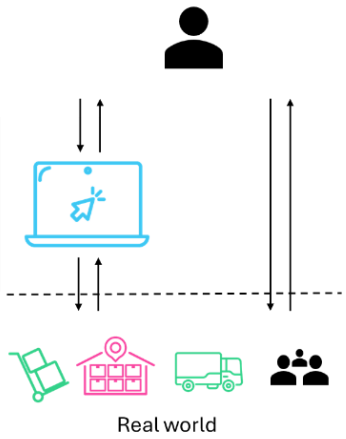
2.4 The need to consider real-world contexts

In everyday life situations, the consumer who values sustainability may need to adapt to meet pressing cost and convenience goals by down-prioritizing non-urgent sustainability goals[3]. In real-world contexts consumers will multi-task while ordering online, face time pressure or the need to attend to competing goals or information. In such situations consumers will make decisions automatically, as a way of saving time and effort, and thoughts of sustainability may simply not arise.

Considering real-world contexts in this way leads to questions about the validity of findings from studies about eco-labelling or default sustainability choices, often based on decisions made in contrived experimental set-ups or surveys rather than everyday life contexts. The problem is illustrated by Figure 1, which presents a model of online consumer choice based on control theory. According to this model, consumers decide on a delivery option using pre-existing knowledge and external information from the real world and the interface. They gather knowledge continually by interacting with the interface and the real world (downward and upward arrows) (Flach and Voorhorst, 2020; see also Stankevich, 2017). In other words, they decide on a delivery option using information from the online platform and from their real-world experience, e.g. a parcel locker that is hard to use or feels unsafe may make them choose home delivery, even though they want to choose sustainably. Understanding how real-world contexts can cause a disconnect between attitude and behaviour, would mean that existing research on the design of delivery choices could be applied in ways that account for how consumers actually decide. Research to achieve this understanding should be based on a theoretical framework that can structure the study of rational and instinctive aspects of delivery decisions made by consumers in real-world situations.

[3] E.g. to get a gift delivered in time for a birthday party, they may need to pay for faster, less sustainable home delivery; or they may need to drive to a pick-up point and back to start work on time.

Figure 1: Model of consumer delivery choice, adapted from the Meaning Processing model of Flach and Voorhorst (2020).

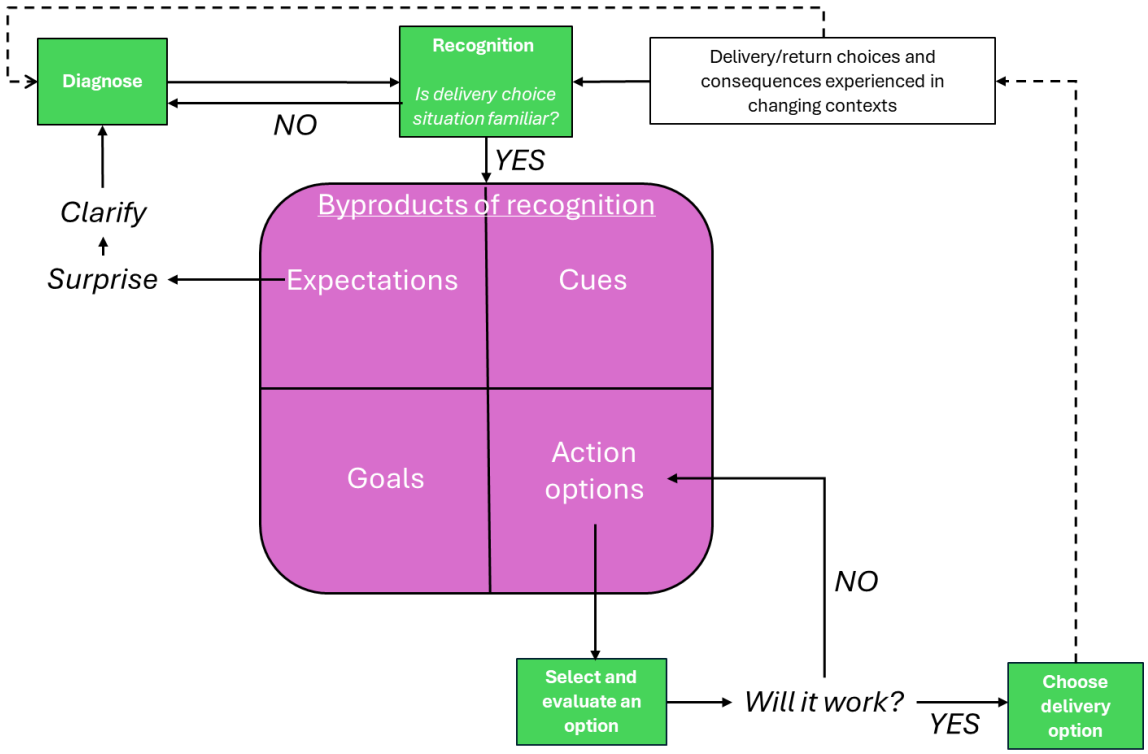


2.5 Naturalistic decision-making

Naturalistic decision-making is a paradigm based on observations that people in real-world or "naturalistic" situations rarely make decisions that are purely rational and deliberate. In real-world situations when time, information or attention is limited, people rely on their intuition, experience and mental models to make quick judgments. To do this they identify patterns in their environment to recognize similar situations encountered in the past. Recognition of a certain type of situation automatically triggers a set of prioritized goals to be achieved, cues to be attended to and explored, expectations to check against, and a selection of suitable actions. Rather than deciding on a course of action by comparing options against a set of criteria (comparative evaluation), people select a single familiar or preferred action and see if it will work in that specific situation by imagining possible futures (singular evaluation). Singular evaluation builds on the well-established idea of *satisficing*, which describes how people often choose the first option that works rather than choosing the absolute best option (Goodrich et al., 2000). The whole process is described formally by the Recognition-Primed Decision model, which has been adapted for the case of consumer delivery mode choice in Figure 2.

The model in Figure 2 explains how people could make singular evaluations on recognizing familiar delivery choice situations. It also explains what people do when they encounter choice situations that seem unfamiliar: they use previous experiences built up across a range of choice situations to *diagnose* the unfamiliar situation as of a *sort* that they have encountered before. An alternative form of diagnosis is when people tap into experience to develop explanations for unexpected aspects of familiar situations ("surprises"). An example of this is a familiar website unexpectedly offering a new delivery option, which the user seeks to understand by applying what they know about existing delivery options.

Figure 2: Recognition-primed decision-making, adapted to consumer choice of delivery option from Klein (2017).



2.6 The need to know how consumers decide on a delivery option

Knowing whether people tend to make singular or comparative evaluations when choosing a delivery option will affect how information should be presented to influence their decisions. Comparative evaluation could be assisted by platforms allowing for the systematic comparison of two or more delivery modes on sustainability criteria. Singular evaluations would be better assisted by a presentation of a satisfactory sustainable delivery alternative and how it might be implemented in practice.

There is now abundant empirical evidence that people make recognition-primed decisions in many real-world settings where decisions are cognitively challenging, involve time pressure, uncertainty and where there are complex and dynamic constraints to be accounted for (Klein, 2008; Ward et al., 2019). Although treated by most researchers as rational, evidence is emerging that the decisions of consumers in real-world situations are also “naturalistic”, e.g. consumers appear to purchase habitually and attend little to product information (Readinger et al., 2004; Crandall et al., 2006, Song et al., 2019, Grummon et al., 2023). This is important because if consumers choose delivery based on the model in Figure 2, behavioural change strategies should be based on singular evaluation. To develop such strategies, there is a need to understand:

1. Instinctive expectations consumers have about the content, presentation and implementation of different delivery options;
2. Cues people instinctively search for when selecting a delivery option;
3. Goals consumers instinctively prioritize and trade off when deciding delivery; and
4. Action options consumers view as feasible in a familiar delivery choice situation.

According to Figure 2, even if a consumer values sustainability, they will still choose less sustainable deliveries unless their action options include sustainable delivery options. Alternatively, consumers might not think that sustainable delivery options will work when they imagine implementing those options. If validated for consumer delivery choices, the model in Figure 2 could also help explain the attitude-behaviour disconnect and how it might be addressed when communicating with consumers. In

support of this idea, Song et al. (2019) finds that consumer preferences for eco-labelled products, as revealed by purchase intentions in naturalistic studies, are lower than preferences stated in surveys or hypothetical choice experiments.

2.7 Research questions

Given the above account, the following research questions can be identified:

1. Are real-world consumer delivery choices made rationally or “naturalistically”?
2. How do varying real-world contexts influence recognition of a delivery choice situation?
3. What cues, goals, expectations and action options are triggered by consumer recognition of a delivery choice situation?
4. How do online platforms help or hinder participants in choosing their preferred delivery option?
5. What role does sustainability play in consumer delivery decisions in real-world settings?
6. How do online platforms help or hinder participants in choosing sustainable delivery options?

3 Methodology

3.1 Methodological approach

Cognitive task analyses have been developed to understand real-world decision-making according to a naturalistic framework (Crandall et al., 2006; Hoffman and Militello, 2009). There are two main settings for analysis, and both aim to access decisions made in authentic situations:

1. Participants carrying out real-world tasks or lifelike simulated tasks.

2. Real incidents related by participants in retrospective interviews.

Both approaches are often combined with favourable results (Williamson et al., 2000).

To study consumer delivery choices as naturalistic decisions, retrospective interviews about specific online shopping incidents were conducted followed by simulated delivery choices using real online shopping platforms. “Think-aloud” exercises were used for the simulations, which involve participants thinking aloud about what they are noticing, considering or wondering about as they shop online, following up with questions to capture what they seem to be ignoring or analysing (Crandall et al., 2006).

3.2 Methods

3.2.1 Preparative workshop

A workshop to gather input for the research interviews was held on 21.9.24 with CodeZERO research and logistics partners and a representative of ASTER Sweden. The workshop verified the method and gave input on consumer demographics to be considered when recruiting participants.

3.2.2 Recruitment of participants

Participants were recruited and interviewed in Norway, Belgium, Netherlands and Italy between October and December 2024. Recruitment was conducted as described in Pernot et al. (2025). In short, participants were invited to interviews by using social media strategies tailored to each study country. Social media reach was targeted to capture participants who would be able to attend interviews in the cities the researchers planned to visit (Oslo, Brussels, Milan, The Hague and Groningen). Posted recruitment advertises included a link to a survey with more information about the project and interviews where those agreeing to interview could give their contact information. A gift voucher was offered as incentive. Participants were informed about how personal data would be managed in the project and asked to consent if they agreed to do so. In selecting participants, the aim was to capture a range of ages, education levels, household types and residential areas. Given the last-mile challenge, the aim was also to interview participants from city centres and suburbs where consumers have access to a wider range of delivery options. Finally, in line with the methodological approach, a few “expert” consumers were included, that is participants who were familiar with both online shopping and sustainability challenges (Ward et al., 2019). To inform the selection, sociodemographic characteristics were collected by asking each participant to fill in a checklist following each interview (Annex A).

3.2.3 Sample description

Table 1 summarizes attributes of the 22 participants interviewed according to country of residence.

Table 1: Participants per country by age group, gender and shopping frequency

		Country				
		BE	IT	NL	NO	Total
Age group (years)	18-30	2	2	2	-	**6**
	31-40	2	-	3	1	**6**
	41-50	-	3	-	3	**6**
	51-60	1	-	-	2	**3**
	61-70	-	-	-	-	**-**
	71-80	-	-	-	1	**1**
	Total	**5**	**5**	**5**	**7**	**22**
Gender	Female	3	2	3	6	**14**
	Male	2	3	2	1	**8**
	Total	**5**	**5**	**5**	**7**	**22**
Online shopping frequency*	+	1	-	-	2	**3**
	++	2	2	2	3	**9**
	+++	1	1	2	1	**5**
	++++	1	2	1	1	**5**
	Total	**5**	**5**	**5**	**7**	**22**

** + once a month; ++ one to three times a month; +++ once or twice a week; ++++ more than twice a week.*

An even spread of age ranges was achieved up until the age of 60 years old, although this was hard to achieve within each country. Norwegian participants were mostly female. A mixture of household types was represented[4]. Reflecting the need for "expert" consumers, the sample was well-educated relative to the average for the national populations, with 13 out of 22 educated to at least Bachelor level[5].

3.2.4 Interviews

The original plan was to carry out retrospective interviews with four participants from each country and think-aloud protocols with a further four participants using three different online platforms. This was altered after pilot interviews showed it would be possible combine the retrospective and think-aloud protocols in single interviews with all participants. Each interview was therefore in two parts:

3.2.4.1 Context and retrospective incidents (Part i)

Questions on previous online shopping incidents were devised based on cognitive task analysis described by Crandall et al. (2006). Questions were added to capture mental models of "how delivery gets done", challenges from online delivery and situational contexts when ordering online.

3.2.4.2 Think-aloud exercises (Part ii)

Participants were encouraged to "think aloud" while they used online platforms in real-time, selecting a product and choosing a delivery option as they normally would do. The instructions and prompts used by interviewers were tailored according to the online platform used and how well the participant responded to the initial instructions. Participants were asked to order an item that they normally would

[4] For data on educational level, household type and residential area of each participant, see Annex B.
[5] E.g. based on EU statistics, 40-50 % of persons aged 25-34 years in study countries had completed tertiary education, equivalent to 7-11 participants. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Educational_attainment_statistics

order, one that interested them, or were given an item to order (e.g. shorts from XXL, hoover from Mediamarkt). Typical probes used to get people speaking were, “What are you noticing”, “What does that mean to you?” or “What are you looking for next?”.

The process began with think-aloud simulated online shopping in the participant’s preferred language. Afterwards participants were asked what sustainability meant to them, before being given a definition of sustainability that was the same as given to other participants (Annex C, Part ii, question 5). After that the think-aloud simulation was repeated, but this time asked the participant to actively choose a sustainable delivery option. To avoid social desirability bias, sustainability was not mentioned before this part of the interview, although a question about what challenges they thought delivery could give to society had been asked in part i of the interview (see Annex C part i).

For most of the interviews the time was evenly distributed between Parts i and ii.

3.2.4.3 Online platforms

For Part ii, participants were asked to use three online platforms popular in their home country. Platforms were selected for diversity in products and delivery options presented, as follows:

- Belgium: decathlon.be (sports), torfs.be (shoes), carrefour.be (groceries)
- Italy: ikea.it (furniture), zalando.it (clothes), esselunga.it (groceries)
- Netherlands: bol.com (all), jumbo.com (groceries), mediamarkt.nl (electronics)
- Norway: xxl.no (sports), ikea.no (furniture), oda.no (groceries)

In four of the Italian interviews (participant codes IT1-4), only ikea.it and zalando.it were used. In one of the Italian interviews (IT5) amazon.it was used in place of ikea.it to explore the delivery options presented there, as they had been mentioned by several participants beforehand. Main delivery options presented by each platform are shown in Annex D.

An attempt was made to leave more time for probing in the think-aloud exercises in four of the interviews (NL4, IT5, NO6 and NO7), but this did not seem to add value to the findings generated in the other interviews.

Sixteen of the interviews took place physically with six carried out digitally. Interviews lasted from 80 to 120 minutes. At the start of the interview, participants were informed about the CodeZERO project and reminded of their rights and asked for consent if they had not yet consented. The sound of the interviews was recorded with participant consent. For most interviews one researcher was present; in the Italian interviews two researchers were present.

3.2.5 Analysis

All interviews were transcribed in full using an automated transcription tool (Autotekst (uio.no)) and afterwards checked manually for completeness and accuracy. Informative platform screenshots, taken during or after the interviews, were included in the text. Transcript texts were imported into N-Vivo 14 and case texts coded using a framework based on the interview questions and developed as new themes emerged, according to Crandall et al. (2006). Relationships between codes were noted and used to develop a concept map of real-time delivery choice. Coding was done in four main sweeps:

- Contextual factors
- Online choice of delivery option
- Cognitive challenges and enablers in online delivery
- Sustainable delivery.

The final coding template is given in Annex E.

4 The unique context of consumer delivery choice

This section describes how shopping strategies, physical surroundings and online platform choices of consumers interact to create unique real-world contexts for online delivery choices.

4.1 Shopping strategy

Each participant had their own preferences for purchasing and delivering certain items online while acquiring other items at the physical shops. Participants varied on the following reasons for choosing to shop online rather than at the physical shops:

- **To save costs**: Many participants thought items were generally less expensive online. Several used search engines (e.g. Google) or umbrella platforms (e.g. prisjakt.no) to make price comparisons. Some subscribed to online platforms offering them discounted prices or less expensive or faster delivery. Notably, respondents did not appear to account for delivery costs as part of the cost of a product purchased online.
- **To access a wider product selection**: Online shopping allowed participants to find wider range of products than they could at accessible physical shops (specialist or out-of-season items or wider range of colours, sizes etc.).
- **To save time and effort**: Participants seemed to vary on whether they preferred physical or online shopping, but most recognized that they often shopped online for convenience: they avoided a trip to the shops, and it was easier to change between online platforms than go from shop to shop. Several participants with children said they valued online shopping to "save time for the family" (e.g. groceries). Others opted to shop online when they did not have time to go to the shops, when the shops around them were unfamiliar (new home or when on holiday) or to save buying, packing and posting a gift to a friend or family member. Many participants shopped online for cumbersome items for ease of delivery.
- **For overview or "embeddedness"**: Some participants preferred to research items on the net, claiming that online platforms afforded them a better product overview than at the shops ("scoping choice is hard at the [physical] shops" / "I cannot filter at the [physical] shops"). But some had never bought food or books online, as they felt they got a better overview and can interact when embedded with products at the physical store. Others preferred the experience of visiting the physical store to shopping online (e.g. Ikea). Some participants combined digital and physical shops, e.g. checking in the physical shops before going online to buy or vice versa ("showrooming", "webrooming").
- **For specific product types**: Online purchases of sports, clothes and household items were mentioned most often, followed by electronics and groceries. Strategies for buying food and clothes varied. Five participants said they avoided buying clothes or shoes online to avoid returns, but others restricted shopping to online platforms offering free, easy returns, trying on clothes at home, returning any that didn't fit.

4.2 Physical surroundings and mobility means

Physical surroundings influenced how online shopping fitted in as part of an overall shopping strategy, as well as collection strategies used. While all participants lived in urban or suburban areas, they varied in:

- **Proximity of home** to shops, work and pick-up points
- **Daily access** to shops or pick-up points (proximity to routes regularly taken)
- **Residence type**, e.g. city apartments with post-box in shared entrance hall vs. detached house with post-box 50 metres away
- Whether they **live with others** needing or collecting deliveries (see Annex B).
- **Mobility means**, i.e. whether they walked, cycled, took the bus, tram or train or own car (electric or diesel; owned or shared) to move in the local area or commute to work.

4.3 Digital environment surrounding delivery choice

4.3.1 Consumer choice of digital environment

Factors influencing consumer choice of online platform indirectly influence the presentation and content of online delivery options. This section deals with the former while the latter are addressed in Chapter 6.

Participants lived, travelled and worked in varying surroundings, and used various tools for online shopping, which could happen in different locations. Some participants ordered using their **mobile phone** to access payment methods easily, because it is "always there" wherever they are. Those who used a **PC** did so to get a better overview (e.g. open different platforms simultaneously). Several swapped between mobile, tablets or PC strategically, e.g. mobile phone on the metro, **tablet** on the sofa and PC when registering for platforms or researching products. Several preferred mobiles to search for new ideas, products or platforms across apps and social media; some preferred PCs for the registering or ordering.

When choosing where to shop online, participants turned to sites they knew and liked. Where they needed to find a new online supplier, they could ask others or find them via Google or sites or apps allowing them to compare across sites offering a certain product (e.g. prisjakt.no). They could also learn about new sites from promotion activities. On arriving at the online shop participants looked for a seamless, secure, and efficient shopping experience with competitive pricing, quick delivery, and a wide range of high-quality products. Participants considered the following factors when choosing online platforms:

- **Product selection** – Wide variety of sizes, colours, materials that can be searched through easily using filters, and for which customer reviews and product information is easily accessible.
- **User experience and trust** – Participants preferred sites that were easy to navigate, offering quick, accurate search functions, and quick checkout including easy payment through pre-linked credit cards or known third parties (e.g. PayPal, i-Deal). Useability, a professional look, known brands, secure payment options and customer service access (e.g. phone support) were linked to trust in a platform. Several participants avoided large, international platforms because of sustainability concerns, preferring direct seller platforms with clear product quality and transparent operations.
- **Cost and speed of delivery and returns**: Several participants mentioned that free or inexpensive delivery options were important when they selected an online shopping platform. This was mentioned more than competitive prices of the products sold. A few participants valued platforms offering express or next-day delivery. Several were willing to sacrifice delivery speed for the sake of cost, but quick delivery (under two weeks) was still expected.
- **Aftercare**: Easy returns and good aftercare (e.g., refunds) were important.

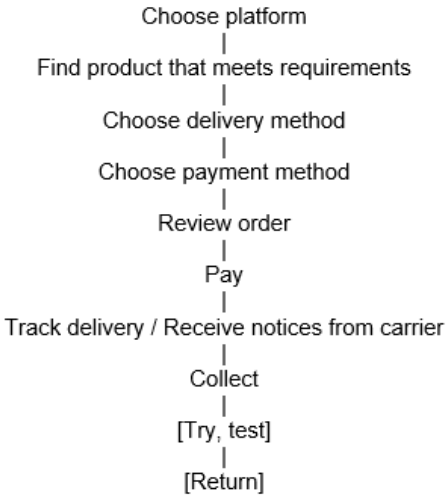
4.3.2 Mental model of delivery choice as part of digital process

Participants' mental models of how delivery choice fits into the online ordering process can be represented as shown in Figure 3. The process is rarely linear. Participants can consider delivery when choosing a platform[6] or finding a product; or they can return to "Find product…" after learning about the cost or speed of delivery options. In general, however, participants did not expect to think about delivery in the "Find product…" stage. Participants expected that delivery would be chosen after products were selected and placed in the basket. BE2 explained that "I don't think about it until after, when you see delivery, then it comes to mind." If participants did think about delivery while choosing items, thoughts appeared to be triggered by marketing presented by the platform, e.g. qualify for free delivery if they purchased items for over a threshold amount. Several participants also thought about avoiding returns

[6] Two Norwegian participants (NO3, NO4) used the umbrella platform "Prisjakt" that allowed consumers to compare the price of products on different websites and the price of delivery and estimated arrival times.

as they selected products, while others sought to ensure that they could return items by checking the return policy, costs and deadlines before ordering items from a site.

Figure 3: Mental model of online ordering based on collective comments of participants



Thus, participants vary in their shopping strategies, physical surroundings, online platform choices and mental models of how delivery choice fits in as part of an online shopping process. These factors interact to form unique real-world contexts that will shape and influence online delivery choices.

5 How do consumers choose a delivery option?

5.1 Delivery decisions are largely recognition-primed

Participant responses in retrospective and think-aloud exercises strongly suggest that most of the delivery choices of consumers are “primed” by recognition of familiar situations. While participants could compare variations of a single delivery mode on one or two variables (e.g. comparing the cost and location of pick-up points offered), or two delivery modes on a single variable (e.g. cost of home delivery versus pick-up), this was rarely done systematically. Generally, they seemed to focus quickly on the first delivery option in a list or the one that “jumped out” because it was familiar or preferred. They then envisaged future events to see if that option would work to satisfy their goals. To do this they built a story by combining information presented by the platform with knowledge of their physical surroundings and potential collection strategies they could use. If the story they ended up telling was one in which the delivery option worked, then they seemed happy to select that option. In this way, consumers evaluated **delivery-collection** options rather than delivery options presented by the online platform in isolation.

The following description of a think-aloud exercise involving purchase of a sofa illustrates how participants could choose a delivery option quickly if the situation was familiar. Arriving at the delivery page, the participant stated:

> *“Home delivery can often cost a lot. We can see that. So often it happens that we order online and then we go and get it for a pick-up.”*
>
> *IT5*

Because she had used this platform several times before, she recognized the situation, and this appeared to trigger a search for information against which to check the expectation that home delivery would be expensive. Having confirmed this, she then started to focus on the usual delivery choice, which is to pick up from the seller’s store. When asked to elaborate on the reasons for this preference, she explained:

> *“Delivery home costs 50 euros. So that's a lot. And then it's only between 0900 and 1300, it's a very long time to wait for the package or wait for the sofa to come or something. So it would be better for us to pick it up in ...you can choose a time when you pick it up, you can say I'd like to pick it up today between 1800 or 1900. And then I know OK, after work I want to drive directly to Parma or on the way home from work.”*
>
> *IT5*

Here, the participant gives other reasons why she favours pick-up from the store, but note that she did not compare options on any criteria and she did not check all the expectations she had (long delivery time slots). Pick-up from the store has become an automatic choice in this situation, and this saves her time and effort that otherwise would be used thinking about and processing information.

There is a downside to this, however, which is that new and sometimes valuable information can be missed. The participant did not comment on the delivery option “pick-up from a place near you”, which would have let her pick up from a location closer to home, as her focus was on picking up from the seller’s store. When asked about this option, she replied:

> *"So I can pick it up and it will be available within 24 hours, and I can pick it up at a shopping centre called Grand Emilia. And it's very close to my city actually. So it's actually very clever, because it only costs us nine euros. So maybe…I would probably have chosen this. But then I have to wait a little longer [before I can collect]. So I might choose another place. No, I see here I can only choose one place in Modena where I live. Otherwise, if I'm going to pick it up in Bologna, I'll drive all the way over here [points to a map like this one:].*

Or Parma, all the way here and it takes an hour, and then there might be a lot of traffic at 1900. So if I can pick it up in the shopping centre, it will be perfect. And yes you see I can choose a timepoint but it's not until [4 days from now] so I have to wait a bit. If I wanted it tomorrow, I would have driven to Bologna."

IT5

Note that information about the alternative delivery option "pick up near you" seemed to be missed due to her familiarity with the delivery choice situation and the way choices were presented by the interface. Also, even when considering an unfamiliar alternative delivery option, the participant still fitted the new information presented into a story to see if it would work. She did this by combining new information from the platform with pre-existing knowledge about delivery, her unique life context and preferred collection strategy. This is not a systematic comparison of delivery options presented on defined criteria, but rather a mental simulation to see if the option would work for her.

Interview transcripts contain examples of participants choosing delivery by focusing on an option of interest and imagining future situations to "see" if it would work for them. Arriving at the delivery pages in a think-aloud exercise, NL2 described how they focused on the cheapest option to see if it would work: "And of course my first incentive is to see, can I deal with the lowest delivery rate?". Responses of NL4 are consistent with the use of platform information to carry out a mental simulation to see if home delivery would work:

"So I see here the dates when it can be delivered. Tomorrow, Saturday, Sunday, Monday…I don't like to have it on Saturday and Sunday because I don't want to stay at home. So I prefer to choose for a day when I'm, for example, working at home. Then I know I'm home and I can receive it. So, well, Monday is a day I am home. But the next thing I see is it's more expensive than having it on Tuesday. Well, and that triggers me. Is it then on other days even cheaper? Oh no, it isn't. So it's just 1 Euro but Monday I'm at home so I will still choose for Monday. And then I can choose a time…"

NL4

Across countries, participants seemed to choose a delivery option by focusing on familiar choices and asking what the available information told them about whether that option would work, and information on other options seemed to be overlooked unless prompted for. This type of decision-making was far more common than systematic comparative evaluation between delivery options on selected criteria. NL3 summarised, "At a certain point you just choose the most convenient one and the one that you know is going to work".

5.2 Recognition of platforms or delivery choice situations?

Familiarity with platforms used in think-aloud exercises meant participants could choose delivery options that suited them quickly. As one explained,

> *"So I do a quick scan of these options, but there again this is a normal online purchase that I do, sports stuff on a known website, I know what I want can orient myself (machine gun sound) it goes so fast, you know."*
>
> *NO3*

Familiarity saves time and effort and can explain why participants tend to go back to sites they know. This process is explicitly supported by platforms allowing registered customers "one-click" ordering in which preferred delivery options are stored as default.

Platform familiarity is not necessarily a condition for recognition-primed choice. Participants seemed to recognize familiar elements across platforms (e.g. express vs. standard delivery). This appeared to allow participants to decide quite quickly even when using platforms for the first time. For IT2, for example, "the decision is quite immediate" to choose standard home delivery whatever the platform, except if they are in a hurry in which case they choose express home delivery. If the site is not familiar, they may check return conditions or even use Google to check what others have said about delivery from that site, but it is usually no problem to understand delivery information and choose options using a general strategy. For example, NL5 described a strategy for evaluation of options through mental simulation that could be applied across sites:

> *"If I know the exact delivery date and that I will be home, I get it at home, if I am unsure, then pick-up point. I have to think where will I be, will I be at work, and when will I be finished to pick up, so I can check opening hours".*
>
> *NL5*

5.3 What influences delivery choice?

Given that participant responses suggested that delivery decisions are recognition-primed, the presentation of factors influencing delivery choice has been structured using the elements of Figure 2.

5.3.1 Goals and trade-offs

Recognition of the delivery choice situation triggers goals for the selection of a preferred delivery-collection option and its subsequent evaluation by mental simulation. Based on participant comments during think-aloud exercises, delivery choice is influenced by needs for cost, convenience, speed, safety, and sustainability, with significant variation depending on the nature of the item, urgency, and personal preferences.

Cost: Many participants prioritized free or "very affordable" delivery. Most were willing to reach order thresholds to qualify for free delivery. Comments of several participants suggested they were willing to pay 5-10% of the item's value, but not for more expensive items. Participants had different views on subscribing to sites, some avoiding it and some subscribing and then cancelling their membership to save 3 Euro on delivery of a one-off purchase (NL3).

Convenience: Participants preferred delivery options that created minimal effort and interference. Thus, they wanted delivery at a time when they would normally be at home or at work or at a place situated close to their home or along their usual routes. Giving participants the ability to control the time, precision and location of their delivery so that it does not interfere with their routines and plans may be key to satisfaction with a platform. Many participants did not like being given long and sometimes unreliable time slots for delivery at home, which meant they would lose control of routines or plans. Participants experienced loss of control if the platform did not let them choose a delivery date – especially if the platform "forced" next-day delivery on them when they wouldn't be at home ("Order by 10 pm, get it tomorrow"). Rather than paying extra for a more precise time slot (2 hours or less), several preferred to collect items from a familiar/trusted and accessible pick-up point, where they could delay

collection until they passed by. It was important that participants could access collection points that were open at times convenient to them.

Cost x convenience: In evaluating options participants often tried to balance cost and convenience, e.g. one participant who liked to choose pick-up looked for the cheapest collection point offered within a certain distance from home, whether it was collection from the seller's store or another collection point. Where home delivery was too expensive, participants turned to see if it pick-up would be convenient, e.g. "if I realize that collecting it from someone costs zero, instead of, I don't know, 5.90 euros for home delivery, if it's not far, I'll [pick up]" (IT1).

Speed (x cost): Participants usually opted for standard delivery but could pay extra for express delivery to reach deadlines such as birthday, Christmas gifts, holidays or if the consumer just wanted to have the item quickly. If a long delivery time is expected (e.g., 10+ days), participants said they would prefer to pay for quicker delivery. Participants were not happy to pay more for delivery of a package that *could* be quicker (e.g. Mon-Wed instead of Mon-Fri).

Safety (x cost): Some participants preferred to pick up items at a collection point as they felt parcels would be safer and managed well until they were ready to collect. Others were willing to pay extra for signed home delivery of more expensive or valuable items and faster shipping, as they perceived these methods as more reliable and secure. Some tried to avoid picking up from an unknown or unsafe part of town, while others tried to avoid carriers perceived as less safe or reliable. This could be a trade-off with cost:

> *"With [platform] I know you can choose [Carrier A] or [Carrier B], then I often choose the cheapest. But if it's the same price, then I choose the one that isn't [Carrier B]."*
>
> *NO5*

Sustainability (x convenience and cost): Some participants considered the sustainability of delivery options when choosing, but not above price and convenience. Some were willing to delay delivery by a day or two to make delivery more sustainable *if* it was convenient. Longer delivery time slots or pick-up locations that are not perfectly aligned with their routes could also be acceptable if they are given a sustainable choice. A few participants avoided unsociable hours for delivery workers when choosing time slots – all else being equal.

5.3.2 Cues

There was ample evidence of the search for cues by participants[7]. The following cues were used to make sense of the choice they had so they could select an option that met their goals:

Price of delivery: This was a priority for most participants, emerging often if the cost of a delivery option seemed high in relation to item cost. Some became frustrated at being asked to "fill their basket" to qualify for free delivery, wanted then to know the price of delivery for the single item they wanted to buy[8].

Preferred delivery method: If participants were familiar with the site or situation, they searched for their preferred delivery method or pick-up point, often discarding surrounding information. The type of product could also trigger a search for preferred delivery methods. For instance, one participant using a familiar site delivering perishable goods looked for home delivery, clicking immediately on "Choose a time for delivery" and starting to choose a time slot – even though other options were available. Searching for preferred delivery options could also be a way of simplifying delivery decisions on less familiar platforms.

[7] A cue is an external stimulus that allows the consumer to recognize features of the environment that matter.
[8] This was often a lot cheaper than the cost of filling the basket, but the information was not provided until later.

Preferred pick-up point or location: Participants sought a map to show them the location of shops, parcel lockers or other pick-up points in relation to their homes, place of work or routes they frequented. In the search for pick-up points, they searched for preferred places (e.g. NL4's DIY store). Icons of familiar shops could reassure the participant, even triggering then to choose that collection point straight away if it was close to home (e.g. NL3).

Narrow time slots: Most participants who selected time slots for home delivery understood why large slots cost less but tried to find narrower ones.

Package dimensions: Some participants sought information on package dimensions to assist in choosing delivery option (e.g. if too big to fit into postbox or parcel locker), or to understand whether it would have to be left with a neighbour (e.g. NO3).

Return information: Participants sought information on return conditions on platforms they were not familiar with.

Payment icon: Some participants used payment icons (e.g. PayPal, i-Deal) as cues that the site – and therefore the delivery it offered – could be trusted. In the absence of such cues, participants would adapt by e.g. checking that the platform has physical stores or checking customer reviews of the site on Google.

Courier icon: Although not evident across all participants there was evidence that recognition of delivery courier could trigger favourable delivery expectations. This led one participant to opt for a delivery method just because it was delivered by a familiar courier:

> *"But I don't know who delivers to them. So I probably wouldn't choose it. I would probably choose this one here, I think. Yes, then I can choose one that is known."*
>
> *NO5*

Eco-label: Two participants sought a "green tag" on delivery options indicating sustainability, and several noticed them if present, although not everyone understood what they meant.

5.3.3 Expectations, surprises and clarification

Expectation is a strong belief that something will be the case or happen. Surprises occur when expectations are not met. As participants evaluated delivery options in the think-aloud exercises, expectations and surprises emerged about online delivery or delivery from specific platforms. Table 2 lists expectations extracted from participant responses as well as those implied by surprises. (Actual surprises are given in Annex F).

Table 2: Expectations emerging from participant comments or implied by surprises

Online platform	Physical delivery
General • Can choose delivery time and place • Home delivery is default[9]. • Can choose home delivery that is free/"very affordable" and slower (takes 3-14+ days) or expensive and faster (1-3 days). • Pay more for delivery on anti-social days/times • Pick-up points with correct, holiday-adjusted opening times Smaller platforms choose delivery option and courier. • Pick-up at service point or parcel locker is cheaper than home delivery. • Pick-up locations that are convenient for me to collect from • Can Click+Collect from any physical store that seller owns • Collection form parcel lockers costs no more than from staffed service points • Precise delivery times (not "in a few days") • No separate fee for package preparation • Delivery fee in proportion to item cost • "Free home delivery", if advertised, applies to all available time slots • Choice of delivery options comes at end of online ordering process. Site-specific: • Return policies (e.g. Zalando easy, free returns) • Membership and advantages (e.g. Amazon Prime, Bol Select) • Value thresholds must be reached to qualify for free delivery • Delivery time (e.g. orders from third parties means slower delivery) • Choice of delivery mode and selection of modes to choose from • Location of collection points • Payment option (e.g. Klarna, I-Deal). • Choice of courier	• "Home delivery" of larger items means waiting at home for many hours. • Get short notice from the courier that they are about to deliver • Will not know whether a home delivery will be delivered to postbox or door • If larger couriers are used, you can use their app to tailor delivery time and location. • Pick-up points have opening hours in the evening and on weekends, when people are free to collect. • Expect heavy items to be delivered outside home but should be inside. Some expected courier-dependent delivery and packaging quality. • Parcel will be delivered to my chosen location* • Parcel will not be delivered later, not to another location, if I am not at home

It was important for participants to understand the delivery choice situation to be able to decide on a delivery option that could work. If information was missing or misaligned with expectations, participants sought clarification by filling in with information or finding reasons for misalignment using previous delivery experiences or real-world knowledge. One example of diagnosing came from a participant surprised that delivery was cheaper on a Sunday:

> *"And then there is date, which day you want it delivered, can get it tomorrow or Sunday…remarkably cheap on Sunday. So then I am thinking – what about these drivers then? Why is it cheaper to get it delivered on Sunday – why? Unless they have horrible working conditions, so I am a little suspicious."*
>
> *NO2*

IT1 was surprised by a new pick-up location:

> *"Number 3 [on map] is a [Parcel] Locker that's new. But I have been to number 8 and in number 9, which is a shop that sells cigarettes and stuff. Yes. OK. And it*

[9] Unless specified, "delivery" means "home delivery". If "free delivery" is advertised, this is taken to mean "free home delivery".

takes ... So I live here, and then it takes two minutes to get here [points on map] so it's right outside the door, very easy."

IT1

5.4 Evaluation of delivery-collection options

In line with Figure 2, each participant appeared to have their own set of action options to select from and evaluate. As discussed in 5.1, delivery options and collection strategies were tied together for evaluation, thus delivery to a shop for collection by walking could be one action option, or delivery to pick-up point for collection by car could be another. The preferred "delivery-collection option" was evaluated by mental simulation to see if it would satisfy prioritised goals. If it did not, participants could either:

- modify the delivery option;
- adapt their collection strategy;
- select a new delivery option for evaluation; or
- stop ordering.

Table 3 gives examples of evaluation of delivery-collection options and alignment with preferred collection strategies.

Table 3: Example of collection strategies and evaluation of closest-fitting delivery option implied by participant responses.

Ppt.	Preferred collection strategies	Examples of delivery-collection evaluation
BE1	• I try to use pick-up point for lighter parcels. I prefer to pick-up at a newsagent 5 min. walk from and on route from work. Leaving it there means I can wait until the weekend to collect if I am busy in the evenings. • I get perishables and cumbersome goods delivered home.	• They want to send it to my nearest pick-up point, but this is not the one I prefer. It will mean a detour for me and an uphill climb on the way back. • I've already received a few parcels at the post station that's further away. If it's heavy, I just stop and rest. I make it work. • I won't be home on the days they give me for home delivery – but I could pick up at the supermarket on the way home. But then it will be too heavy to carry back in my rucksack
BE5	• I prefer home delivery. • If I won't be at home, I will collect at a pick-up point that I like that is reliable and open most of the time.	• …because it will be ok if I'm not at home at that time, because I think my friend will be there to receive it
NL2	• I pick up if item is small and will be available sooner. • I will pay more to get the time and place for delivery of large items right first time. • I will pay more for home delivery of groceries as they need to come quickly.	• Can I leave work early that day to fetch it in time? • I might not be home by six o'clock if the train is late or I have to stay at work for 10 minutes more. • I am thinking will I be home or not, and if I'm not at home, to which neighbour can they deliver?
NL4	• I try to get things delivered home if no extra cost. • Otherwise I pick up from a preferred pick-up point, a DIY store open from 9 am to 7 pm, 800 m by foot. • If the item is heavy or lack of time, I will collect by car.	• I am thinking, does it fit through my mailbox? I think since there is no extra cost I will choose just for tomorrow and hope it fits my mailbox. • I don't know if anyone will be home, but I think it'll be ok, they will deliver to the neighbour or the parcel shop. • My favourite DIY store is not available for pick-up so I want now to assess others, how far away, good opening hours, open on the weekend, maybe a supermarket as I will be shopping soon.
NO3	• I choose home delivery if inexpensive; if not, for small items I will select a pick-up option. • I prefer "Click+Collect" if cheaper than home delivery and the cheapest pick-up option. • I select a pick-up location next to work if it means can get item sooner at no added cost.	• It is close to where I work. If I needed it quickly, I could get it quickly that day in my lunch break or after work. • This would not have space in my postbox so it would get delivered to the nearest post office (in shop). • For pick-up points I get a rough idea of when I can collect and if it is convenient, because I can think of it in relation to routes I plan for different days.

Despite dependence on living context, many participants had a favourite pick-up point they knew to be reliable, close to home or on their usual / favourite route and with suitable opening times.

5.5 Experienced consequences of delivery choices

Many participants commented that they were generally satisfied with delivery, but all participants could recall challenging delivery experiences. All participants could tell a story about their last delivery experience, and seven of these stories contained negative experiences. Such "bad" experiences are important to avoid as they can influence future choice of delivery option. The challenges captured suggest consumers want more controllable, reliable, and transparent delivery options (Table 4).

Table 4: Types of challenging consequences of delivery choices according to participants.

Delivery challenge	Examples
Delivery time	• Customer unable to choose a convenient time so parcel arrives too early / late • Estimated time of arrival unreliable / Delivery arrives after deadline (birthday, Christmas). • Wide time slots for home delivery (e.g., 10 am - 6 pm) make it hard to plan or relax (*"Going to the toilet even is a pain because you think, oh, any time somebody can ring the bell"*) • Food deliveries arrive too late for mealtimes.
Communication during delivery	• Confusion over delivery status (e.g. delayed shipments with no communication or "bundled communications" during the wait). • "Too much information": Multiple emails about every step of the delivery process. • No clear instructions or updates when parcels are delayed or misplaced.
Delivery location	• Parcels left in inconvenient or unsafe places (e.g. left on the mat outside or unsafe district). • No prior notice of delivery location • Packages sent to unexpected or incorrect locations (e.g., an unfamiliar parcel locker far away instead of at home) • Parcel lockers difficult to find or malfunctioning (e.g., doors that won't open) • Limited opening hours at collection points, making it difficult to pick up items. • Long travel times or distances to retrieve parcels delivered to the wrong locations.
Returns	• Returns require excessive time and effort from e.g. repacking items neatly, printing labels without access to a printer, and coordinating drop-offs during limited hours. • Issues with return labels for mixed-up or incorrect parcels. • Paying for collection services when you need to return a product. • Not bothering to return due to costs or not knowing how.
Carrier	• Drivers not speaking the local language, communication problems. • Poor parking or unsafe driving. • Consistently delayed delivery due to house being the last stop on the delivery route. • Consistently unreliable delivery from specific carriers.
Package	• Mixed-up parcels, receiving someone else's items or incorrect deliveries. • Damage to products during delivery.
Customer control	• Lack of control over delivery timing / location (e.g., forced to pick a delivery time or location without options). • No option to change the delivery preferences once the order is placed. • Difficulty in understanding the process or tracking shipments (e.g., not knowing where the product is coming from or where it's being sent). • Perceived lack of control over whether large item will be delivered outside, in the hallway or inside the door.

Most of the participants related several stories about delivery challenges, and often the same participant could identify challenges with each delivery method they used. Delayed delivery, delivery to an unexpected location and confusing communication seemed to be common challenges across countries. An illustrative example was given by NO1, who ordered a balance that she had chosen to get delivered to a parcel locker outside a supermarket where she did the weekly shopping. On the day of the delivery, when the carrier found that the parcel was too big for the available locker compartments, they drove it 40 km back to the terminal. Two days later the parcel was delivered, this time to an unfamiliar location 3 km away from the participant and in the "wrong" direction. NO1 had received many messages about where the parcel was but had no way to influence events (lack of control). A different participant summed up that, "Often I don't know where the parcel is coming from or where it will end up." Other participants reported being confused by repeated and unclear communications from the carrier:

"I can think it has arrived and go to collect and find it is still on it's way - I have misunderstood the message because they all look the same, or I can get a reminder to collect something I have already collected and go and try and collect it again."

NO1

As noted above, however, most delivery experiences are not negative. Participants expressed satisfaction with the following aspects of delivery:

- Punctuality (e.g. "arrived on 12th working day as predicted").
- Pick-ups that they used routinely and had got to know
- Return process that was smooth and hassle-free – perceived as offered by several of the larger platforms (e.g. Amazon, Zalando).
- Tracking of deliveries and returns, appreciating the transparency it gave (though only used exceptionally)
- Helpful couriers and familiar, trusted delivery drivers who knew customer routines and preferences.

6 Role of interface in delivery choice

When participants were asked if they found ordering online difficult, or any particular step difficult, most answered no. Where a difficult step was mentioned, participants named payment and the physical delivery process before choice of delivery option. Despite this, responses in the retrospective interviews and think-aloud exercises showed users experienced several barriers to delivery choice.

6.1 Barriers

Interface barriers to choosing delivery options have been grouped and presented in Table 5. A common challenge was that platforms pre-select or limit delivery choices such that users feel they have inadequate control over delivery timing or location. If the chosen options don't meet their preferences or needs, users could feel frustrated and even want to leave the platform. One participant, for example, wanted delivery in three days rather than the next day, when they knew they wouldn't be at home:

> *"There is only like tomorrow. So I can only pick tomorrow. I have to wait and [come back and order the item] later, but then I might forget, or I need to then put that in my to-do list. I need to do that, but as I've already done all the process, that's really annoying."*
>
> *BE1*

In several of the think-aloud exercises, participants did not notice or find valuable information about delivery as the user interface was not instinctive to use. Users also looked for more transparency concerning delivery options. They wished that the seller was clear about where the product was coming from. Some struggled to understand why delivery was priced as it was, and some wanted to know delivery costs earlier in the ordering process. "One-click" ordering in which default delivery options are set make ordering more efficient but make delivery conditions poorly visible to customers.

> *"We use a common profile so we pay Prime, basically, and so there is already its first address set and so sometimes you make a mistake because for example on Amazon if you click quickly you have practically already made the purchase and you don't even know where they will send it to you."*
>
> *IT1*

Finally, several participants looked at delivery to or pick-up from work as an option and others thought this would be a good idea. There was little on the platforms to account for this as an option:

> *"You don't think of that yourself as an alternative. It would be very effective as there are so many here, to deliver to them. It wouldn't be too much for me to carry home and I sit here from 08 to 16 so they have a nice big window to deliver in. We have delivery [by Carrier X] at the office everyday as it is."*
>
> *NO3*

These barriers reflect the broader issue that many online platforms lack user-centric designs, often prioritizing convenience or cost for the platform over ease of use for consumers. Using the findings in Table 5 to enhance clarity, providing more flexible options, and aligning with user expectations could help reduce these barriers significantly.

Table 5: Challenges to delivery choice experienced by participants using online platforms

	Example	Description
Forced choice of options	Express delivery	Platform assumes user prefers delivery as soon as possible, but user finds this inconvenient
	Pick-up points	Platform does not account for user context, e.g. offers pick-up points further away than physical shops; selects as default nearest pick-up point that is not convenient for the user; open only when the user is busy or at work
	Carrier	Some participants liked to choose a preferred carrier, but this was not possible, or no carrier information was given.
	Costly option	Users felt that a platform "wanted them" to choose home delivery or the most expensive delivery option
Confusing present-ation of options	Non-intuitive	Hard-to-find information on delivery options, e.g. even if available, map of pick-up points / list of opening times not found by users.
	Long wordy lists	Long lists of delivery options in terms that users must work to understand, e.g. "Click+Collect" and "Click+Collect Near You".
	No standard terms	Different platforms using different terms for the same delivery method e.g. Collection point, service point, pick-up point, collection near you.
	Distractions	Marketing information alongside delivery options: "*There were so many choices and much information, so I just thought, no, I just want to go further. There were too many offers they tried to push on me."* NO5
Information content of delivery options	Missing	No information given about expected time of arrival or stated simply day of arrival; Addresses of pick-up points given without opening times or map showing location or distance relative to home or work; No contingency plan for delivery – if carrier cannot deliver to agreed point, users do not know what will happen instead.
	Inaccurate	Information on pick-up/return points inaccurate, outdated, missing: "*in their map there are some locations that say here there is this shop and you can deliver here, but that shop doesn't exist*." (NL2)
	Misleading	Users misled by delivery information used for marketing (e.g. "Buy for 25 Euros to qualify for delivery") that turned out only to apply for selected delivery methods.
	Hard to use	Users find number of working days before order arrives hard to use (prefer dates); One platform advertised "pay 25 Euro to qualify for delivery" interpreted by users as "pay 25 Euro to qualify for free delivery".
Process flow	Too early choice	Users asked to decide between home delivery or pick-up from store before timeslots for home delivery and associated costs are presented. User asked to choose between "Buy" or "Click+Collect" before knowing what delivery options are available.
	Too late choice	Users asked to choose a time for delivery after they have paid; time slots come up too late in the purchasing process, so users must go back, adjust their choices
Transp-arency	Product source	Some users surprised on receiving information about product source after ordering.
	New options	Hard to understand how parcel lockers, cargo bikes, mobile pick-up points work.
	Pricing structures	Users could not understand why: Home delivery and pick-up options are priced the same; Parcel lockers cost more than collection from a staffed service point located in the same supermarket; Costs same for customer to collect as it does for home delivery; Disproportional increase in cost for delivery of large items inside the door vs. road-level; Costing of time slots e.g. cheaper on Sunday or for earlier dates.
	Delivery costs	Price-dependent free delivery is made transparent early in the ordering porcess (e.g. "buy 50 Euros worth of goods and get free delivery"), but the cost of delivery for low value purchases is not given until later.
	Returns process	Inconsistent or unclear return processes add to the complexity and frustration, as users may not know where to return items or what the requirements are.
	"One-click"	Default delivery options make delivery conditions poorly visible to customers.

6.2 Enablers

Several ways in which the online platforms could enable delivery choice were also identified directly from the interviews:

- Meaningful item / package size and weight dimensions (“who knows how much 50 kg is?”)
- Reliable, up-to-date expected time of arrival
- Can opt to consolidate several parcels ordered into one single delivery
- Accessible customer service
- Can see available delivery options by entering postcode or address as site visitor, without having to register personal details
- Clear summary of order to include clear statement of delivery time, location and contingency plan
- Elegant, non-fussy presentation e.g. radio buttons to choose home or pick-up, then choose date and time for home delivery or location for pick-up.
- Pick-up:
    - Range of pick-up options with evening opening times, distance from home/work
    - Pick-up locations in well-known, safe places / in or near places that you go to for other purposes (e.g. supermarket, newsagent, metro stop) / helpful personnel where relevant
    - Interactable map with clearly labeled pick-up locations and opening times around location that can be entered by user (e.g. home, work)
    - Different collection location options that cost the same

6.3 Carrier interface

Although outside the scope of the current study, carrier interfaces/apps are playing an increasingly important role in user delivery experience. Participants expressed frustration at having to use so many different carrier apps with different formats. They wanted to receive several hours’ notice before a package would arrive at the collection point as well as when it would arrive. They liked being able to express preferences through the carrier app e.g. neighbours parcel can be left with, where to deliver if not at home.

6.4 Learning from product choice

Given that extra resources are used to make product choice interfaces easy to use, another way to learn how participants might like delivery options is by looking at what they find appealing about product choice interfaces. For instance, several users like to use search functions or narrow down options using filters, focusing on essential attributes like colour, size, and price. Pictures of products allowed users to attend to its main features and envisage the product in use. An important strategy appeared to be to find an acceptable product by browsing pictures and “headline” information alongside price. Simple tags allowed consumers to easily discern new or special-offer products. Quality assessments were made from brand reputation or customer reviews. The latter seemed particularly important for several participants. The choices of some participants were also steered by promotions or discounts, while others prioritized filtering out unwanted items over being drawn to discounts.

Thus, designers of delivery choice interfaces can learn from product choice interfaces by considering the use of pictures and headline information (price), tags to draw attention to new or discounted delivery options, and offering assisting selection of information for options users they know they will choose e.g. just see options for home delivery. Designers might also consider integrating considerations of delivery options with product choice, e.g. allow users to rank products by delivery date.

7 Choosing sustainable delivery

Results presented so far can be used to understand how consumers currently think about and decide delivery options. They also suggest that sustainability plays only a minor role in current delivery choices: it was neither a prioritized goal for participants nor visible on most of the web platforms used. In the final part of the think-aloud exercise participants were asked what "sustainable delivery" meant to them, before being given an operational definition of sustainability and, finally, asked to choose what they thought was the most sustainable delivery option provided by each platform.

7.1 Participant awareness of sustainability challenges caused by online delivery

Consumers appeared to think more about buying sustainable products (e.g. buy locally, avoid products made far away) than they did about choosing sustainable delivery options. Altogether the participants mentioned 12 different sustainability challenges caused by online delivery (Table 6; cf. Annex G):

Table 6: Challenges for society or sustainability caused by online deliveries

Challenge	No. participants out of 22 in total
Return transport	14
Express delivery / less-than-full	10
More parcels to more places	10
Emissions (including flights)	8
Congestion, parking	7
Working conditions	6
Loss of social connectedness	5
Home delivery	3
Buying products from afar	3
Packaging materials, space used	3
Free delivery or return	2
Traffic safety	2

The inefficiency of return transport from homes or collection points was mentioned by most participants as an issue, followed by the challenge of efficiently organizing express delivery and delivery of more packages to more places (logistics). Out of 22 participants, only eight named gas emissions created by online deliveries as an issue for society. Although a diversity of challenges can be seen in the pooled responses, the average participant only mentioned three or four challenges (the absolute number ranged from zero to eight challenges per participant). Participants had limited and inconsistent ideas about sustainability challenges caused by online delivery. The result that consumers have limited awareness of sustainability issues is consistent with Pernot et al. (2025) and was found even though participants in the current study generally seemed to have more awareness of how delivery is done (see Annex H).

7.2 Choice of sustainable delivery

After being given a standard definition of sustainable delivery (see Annex C Part ii, question 5), participants were asked which of those delivery options offered by the platform they thought would be most sustainable. Participant thoughts about the sustainability of each option were context-dependent, varying according to the location of the participant's home or delivery address relative to collection points and shops, the type of product delivered, transport used to pick-up points, and so on. Even though they were not asked directly to do so, participants continued to think about cost and convenience

while choosing sustainable options, trying to choose an affordable, pragmatic and sustainable option. For instance, one said that the most sustainable option was pick-up from a collection point but said they wouldn't go there if it was too far. Another chose Click+Collect but pointed out they probably wouldn't do this as they wouldn't have time. Where it was an option, Click+Collect was chosen as the most sustainable option by most participants, followed by collection from a pick-up point. Home delivery was seen as the least sustainable delivery option. Reasons given varied, but a few linked sustainability to the level of consolidation possible by each method. As NL2 said, "there are just a few shops, more service points and even more houses".

7.3 Barriers to choosing sustainable delivery options

Several of the interface barriers reported in Section 6.1 also complicated decisions about which of the delivery options presented was most sustainable e.g. too many options, unclearly differentiated options. As for delivery options in general, platforms don't integrate sustainability into the "decision flow" in an intuitive way. Overall, the main barriers to choice of sustainable delivery option revolved around a lack of transparency about the sustainability of delivery options, with convenience and cost often taking precedence in cues presented by platforms.

Barriers specific to choosing sustainable delivery options, as evidenced from the customer comments, can be summarized as follows:

7.3.1 Platforms give little or no sustainability information

Whilst they could make educated guesses, users were very unsure of which delivery options were most sustainable. They said they found out more about how delivery would happen after the order was made than before or during choice of delivery option. Before order confirmation was sent, most of the platforms used in the think-aloud exercises said little or nothing about vehicle type, motor/fuel, energy used, distance travelled, carbon footprint or anything else about sustainability of the delivery process or different options available. There was no accessible information about whether delivery would be conducted by an electric or fossil-fueled van (though one site used cargo bikes). Even though participants generally thought standard delivery options were more sustainable than express options, wider delivery slots for home delivery were more sustainable than narrow ones, and that pick-up-at-shop was more sustainable than home delivery, they remained uncertain and felt that most platforms were insufficiently transparent and did not explain this clearly:

"I mean it could be that for instance they are already delivering to collection points or even to homes with cargo bikes, but it's not visible, I don't know. I can't really pick that option and pay more [for sustainability] if I wanted to. So no, actually I have no clue about how it will get delivered….you're absolutely not in control."

BE1

"Some platforms maybe have more ecological systems, more sustainable in transport, some others less, but [whichever the case] I am not aware of how they transport."

IT1

Interviewer: Do you think you have enough information to decide on the most sustainable delivery option? "No, I have to invent it based on my information. I think I have the right information, but maybe I don't know."

IT4

Lack of information also concerned packaging:

> *"If I wanted I sponsor it a lot – I appreciate it that it is recyclable and so on -- but you don't know it until afterwards when you receive it."*
>
> *IT1*

IT4 would have liked to see information about the nearest store to his house that sold the product he wanted. He wanted to see a sustainability-cost classification for different delivery options. One participant, BE2, thought it was on the shipper to choose the most sustainable delivery option, but it was on the customer to buy sustainable products and collect from pick-up points using sustainable transport modes.

7.3.2 Sustainability depends on seller, carrier and other consumers

Deciding whether home delivery or picking up at store or other collection point was more sustainable depends on various factors like efficiency of seller's internal transport network, transport modes used to transport to and from houses or collection points, whether delivery vehicles are filled to capacity, distance driven versus density of delivery points, and so on. Lacking such information, users naturally struggled to know for sure which was the most sustainable delivery option or rank options on sustainability. The best they could do was guess. Some thought that pick-up points were more sustainable, but could be unsure if they needed to travel to the pick-up point by car, which would negate some environmental benefits:

> *"That's a little bit difficult because if you're talking about the pick-up point, yes it's more sustainable in terms of delivery, because they…they pretty much don't have to deliver it to my home. [But] I think the sustainability question actually goes out of the window because I would have to travel to this shop probably by foot because it's close by, but they still have to transport it. And I don't expect them to transport it by foot or by bike. That would be a delivery truck. So whether the delivery truck goes to the supermarket or comes two minutes from my place…Okay, I can see that if they go to the supermarket as a collection point, they probably deliver 50 packages rather than going to 50 different houses. So there is some benefit. But if I consider whether all of these 50 people would go by foot or not, then I don't know what would be the added value. So then the benefit actually of sustainability of going to pick it up is not that big."*
>
> *IT3*

> *"If there are many lockers in many areas, I don't know if they are much more sustainable than a delivery at home."*
>
> *IT1*

> *"I have to go out with a car or someone else has to go out with a car and drive to me, or near to me. I am not getting on the bus, so there is not much here that helps me choose sustainably."*
>
> *NO5*

Thus, users lacked information about both the transport and consumer side of the delivery to conclude about the sustainability of different options. Transport modes used by individual customers to the pick-up point and whether they would go there just to collect the parcel also influence sustainability. Choices by other consumers also mattered.

Decisions on sustainability of time slots for home delivery options are simple in comparison, and some platforms do label wider time slots as more sustainable using green leaves. In the absence of such eco-labels, some participants seemed to believe that narrower time slots cost more because the seller wanted to make more money or that it was less efficient for the seller.

7.3.3 Platforms market cost and convenience at the expense of sustainability

The way platforms promoted low-cost and convenient delivery options made it difficult for users to choose sustainable delivery options. Retailers want to meet consumer demands for cheap, convenient and fast delivery, so these factors are clearly communicated and even used as marketing tools. For example, faster delivery is often less sustainable and more expensive, but customers often demand it. Platforms exploit this by tying in affordable express options to platform membership, effectively promoting less sustainable delivery.

Other signs that platforms prioritized marketing over sustainability were:

- Advertising free and easy returns
- By setting home delivery as default (though some had “Click+Collect” as default).
- By encouraging impulse purchases and more deliveries.
- By encouraging users to view all the products that you could order to arrive the next day.
- Poor facilitation for consumers willing to delay shipping until they have ordered 3-4 items.
- Two-hour daytime home delivery time slots could cost less than six-hour daytime slots.
- Convenience of one-click ordering to home address.
- Pricing home delivery as the same as or cheaper than pick-up options:

"If you are going to provide a service which is more sustainable for the same price [as a more convenient option], no one is going to choose it."

NO6

"Damn! Is it possible that I go and collect it, and you make me pay 5 euros - the same price as home delivery - come on! I'm going to get it delivered!

IT3

Users generally expressed willingness to pay a little more for sustainability, but not at the cost of their normal delivery conditions they were accustomed to (but see Section 7.5). As one user said, “what sustainability can I get if I pay 5 Euros more?” (NO4). If sustainable delivery options cost more, however, they may still not be chosen if the consumer is not aware of the benefits to society of doing so.

7.3.4 Delivery choice as a last step in ordering

Related to marketing, users pointed out that delivery is often chosen at the end of the purchase when they had used their budget on buying products, and so often opt for the cheapest – and possibly less sustainable – delivery option. Others pointed out that they did not consider carefully at this stage as they just wanted to finish the order, often having used more time than intended. Another user pointed out, they were in “how can I get it quickly?” mode at this stage of the process and not minded to spend effort and time on delivery choice.

7.3.5 Lack of understanding or trust of green labels

A few users were sceptical about the use of eco-labels to convey to users which time slots for home delivery were more sustainable. They were not confident about the transparency or accuracy of the sustainability claims. Several users did not understand why eco-labelled home delivery time slots were priced as they were, e.g. "So very strange. No, it's like ... sometimes you get a green leaf as a symbol on some of these times." (NO6). One said they did not understand how much choosing a eco-labeled time slot for home delivery would reduce environmental impact and wanted to know more[10]. In a think-aloud exercise with a platform offering cargo bike delivery, one participant elaborated: "it made me

[10] This was after clicking on the “i” icon and finding out that it enabled supplier to delivery to neighbours at the same time.

understand it's sustainable but [put a green leaf on and] tell me the impact…I want to believe in the option, make me know what to do to do the right thing" (IT1).

7.3.6 Carrier barriers

Several users pointed out that having carriers ensure that delivery happened when they were at home would avoid extra transport and collection of items and improve sustainability.

7.4 Enabling choice of sustainable delivery options

Enablers of delivery option choice are also relevant for sustainable options. The following enablers of choice of sustainable delivery options emerged from user comments:

Digital enablers

- Explain the sustainability benefits of waiting:

"I would appreciate it if they had maybe said it can arrive tomorrow, but in order to make it happen tomorrow there will be a cost on the greater collectivity; but if it comes in ten days maybe they do a collection of various things and it comes to you a bit later but you know …..[…]… I have never found this thing on any site…[let me] think about my grandchildren for a better world or so that they can breathe better."

IT1

"Explain to me that by waiting we can deliver 100 parcels together instead of 10…good to make me pay more if I want it quicker but explain the benefits of waiting."

IT3

- Use eco-labels
  - Essential for time slots as most users do not understand which are most sustainable
  - Add simple message that option is better for the environment (e.g. Jumbo's "we drive fewer km" was accepted and understood by most users)
- Show relative distance traveled by truck for each option
- Promote pick-up of smaller parcels from work as option (tie-in with work-place promotion)
- Raise customer awareness of parcel lockers, how they work, where they are.
- Get more consumers to use same collection point for sustainability (map the most used / preferred points?)
- Show pick-up points "within 10-minute cycle ride" and display as such
- Statement about carbon emissions of different options to consider when choosing between them
- Enable choice of cargo bikes
- For "Click+Collect" show if item in stock at store to be collected from or whether it needs to be transported there
- Umbrella app could say which shop is closest to you has the product
- Rank delivery options by sustainability score
- "Click+Collect" or pick-up as default instead of home delivery

Digital / physical enablers

- Raise profile of electric vehicles as carrying out sustainable delivery e.g. by clear labelling of vans and trucks in the physical environment matched with symbols on the digital platform
- Make user more aware of pick-up point options, note that one participant realized under interview that there were alternatives to home delivery that were very feasible for her.

"Like the pick-up point, if I have a pick-up location very close, maybe five minutes walk from my home, I prefer that. I definitely prefer that….even a little convenience would be maybe great for the sustainable option...because we saw all the options for the pick-up point, and all of them were really close to my place."

BE4

Physical enablers

- Minimal packaging when delivering makes return easier too
- Think of more sustainable collection points e.g. points that coincide on carrier's and consumer's normal routes
- Prevent wasted trips by getting neighbours, shops, businesses to take in parcels for people not at home
- Train cargo cyclists in customer relations and use same ones on same routes as much as possible
- Instead of returning items over long distance, encourage returners to "sell" items at a discounted price to a local outlet.

7.5 Awareness-choice disconnect

Many comments suggested that participants were aware of sustainability challenges of online shopping and delivery, but that this did not affect their choice of products or delivery options. Here evidence is presented for this awareness-behaviour disconnect. It should be accounted for when communicating on sustainable delivery choice, alongside contextual factors and barriers to delivery choice.

BE1 thought that she shopped too much on global platforms, saying "I still buy there and I know I shouldn't somehow". Even though she had read articles about warehouse conditions these platforms create, she thought that time, financial constraints and a lack of "ethical alternatives" drove continued use of global platforms and less sustainable choices. In a think-aloud exercise on observing BE1 filling the basket with items, the interviewer asked, "So you're looking for something to make it up to 50 Euros [and qualify for free delivery]?", to which she replied, "Yes, but I don't really need to - that's the tricky part."

BE2, after stating a preference for home delivery, said they chose it as the only practical solution even though they knew it was less sustainable. BE3 commented that they would find things in the local shop and order it online to their home even though they had thought about increased emissions associated with home delivery. BE4 was slightly different in that questions about sustainability put at the end of interview seemed to make them more aware and concerned about how delivery choices made earlier in the interview might seem to the interviewer.

"Please don't judge me, but I think the purpose of this interview is to be completely honest....I know it's selfish, but this is how it is.[…].But saying that out loud, I'm a bad person, it just hurts. Oh my God, I never think about it. That was really interesting. It's like, how do we get... Like you say, it's like it's real life and people are always going to want to choose fast and cheap."

BE4

Similar responses to the Belgium participants could be found among participants from Italy, Netherlands and Norway. On recognizing that collection point pick-up could be more sustainable than home delivery, IT1 said "You don't always do it because of the time, the laziness or the comfort - but we should be more aware and do it". IT3 recognized the issue in a similar way but thought that the seller shared responsibility:

"If I think that maybe I have ordered something worth a Euro, and order delivery tomorrow? And by the way, I don't care at all that it arrives tomorrow. But they want to make it arrive tomorrow. I don't feel good."

IT3

After talking about packaging waste, IT5 said “but I think ... maybe because I'm very spontaneous when I buy…I only think about it afterwards”. After explaining that local shops were only 10-15 minutes’ walk from his home, NL2 added, “and I’m *still* online shopping”.

NL4 also alluded to a disconnect between awareness and behaviour, saying “just now we are talking rationally about it and asking which problems there are for couriers maybe, but as a consumer...I don't think about it”. Finally, like BE4, NO4 became acutely aware of the potential sustainability implications his own delivery choices as the interview went on. NO4 also pointed to a way forward:

> *“I think I like others I am focused on me and my needs. I just want that product home. I would love to say I thought more about the environment and all the trucks around polluting but I don’t. My need is to get that product home to me quickly..[…]..And it’s embarrassing because I see that I am caught up in my own selfish focus, and I become aware that this is not sustainable for society over time. We need to be made aware of it in the same way that we have with use of shopping bags…“The big bag cut” that said, if you are going to the shop tomorrow, remember to hang bags on your door. Very good, because I forget bags always when I am going to the shop. So we need something like this with online shopping too. We are lazy and selfish consumers who need to be made aware of it, that is what I feel after this chat. I should stop thinking just about my own needs. As a user we are so quick, we need to be made aware the whole time, so then I think people would choose green, we know it is important, but we need to be made aware.”*
>
> *NO4*

8 Conclusions

Retrospective interviews and think-aloud simulations were conducted with 22 consumers from towns and cities in Belgium, Netherlands, Italy and Norway to learn how consumers choose delivery options when ordering online in real-world situations. The ultimate aim was to better align behavioural change strategies with the way consumers think, so that more consumers will be influenced to choose sustainable delivery modes. The methodological approach was taken partly to account for the disconnect observed between sustainability awareness, attitudes and intentions on the one hand, and actual behaviour in real-world contexts on the other.

8.1 Consumers choose by envisaging delivery-collection options

The findings suggest that delivery option choices made by consumers are largely recognition-primed choices. While participants could compare variations of a single delivery mode on one or two variables, or two delivery modes on a single variable, most decision-making seemed to be based on singular rather than comparative evaluation. In other words, the thrust of participant comments in the think-aloud exercises were centred around selecting an instinctively familiar or preferred delivery option and imagining how “things would go” if they were to choose it in a specific delivery situation. There were no instances in which participants decided after comparing delivery options systematically on a set of criteria. This is in line with the Recognition-Primed Decision model in Figure 2.

Evaluation by participants of delivery options presented by the platform mostly involved assessing how convenient the delivery option would be. Participants seemed to focus on a delivery option, then apply a preferred collection strategy (e.g. wait at home for a signed delivery; cycle to a pick-up point after work) and then envisage how that “delivery-collection” option would work for them. The subject of evaluation was therefore not the delivery option offered by the platform, but what it meant to the participant in terms of a delivery-collection option. This implies that when communicating with participants about sustainable delivery options, retailers or others wishing to promote sustainable delivery should consider how consumers will make sense of the option in terms of the collection strategies implied for them. When considering unfamiliar delivery options, participants could adapt and devise new collection strategies. If consumers have not used a sustainable delivery mode before, communication to suggest easy, convenient collection strategies might help them devise the new strategies they need.

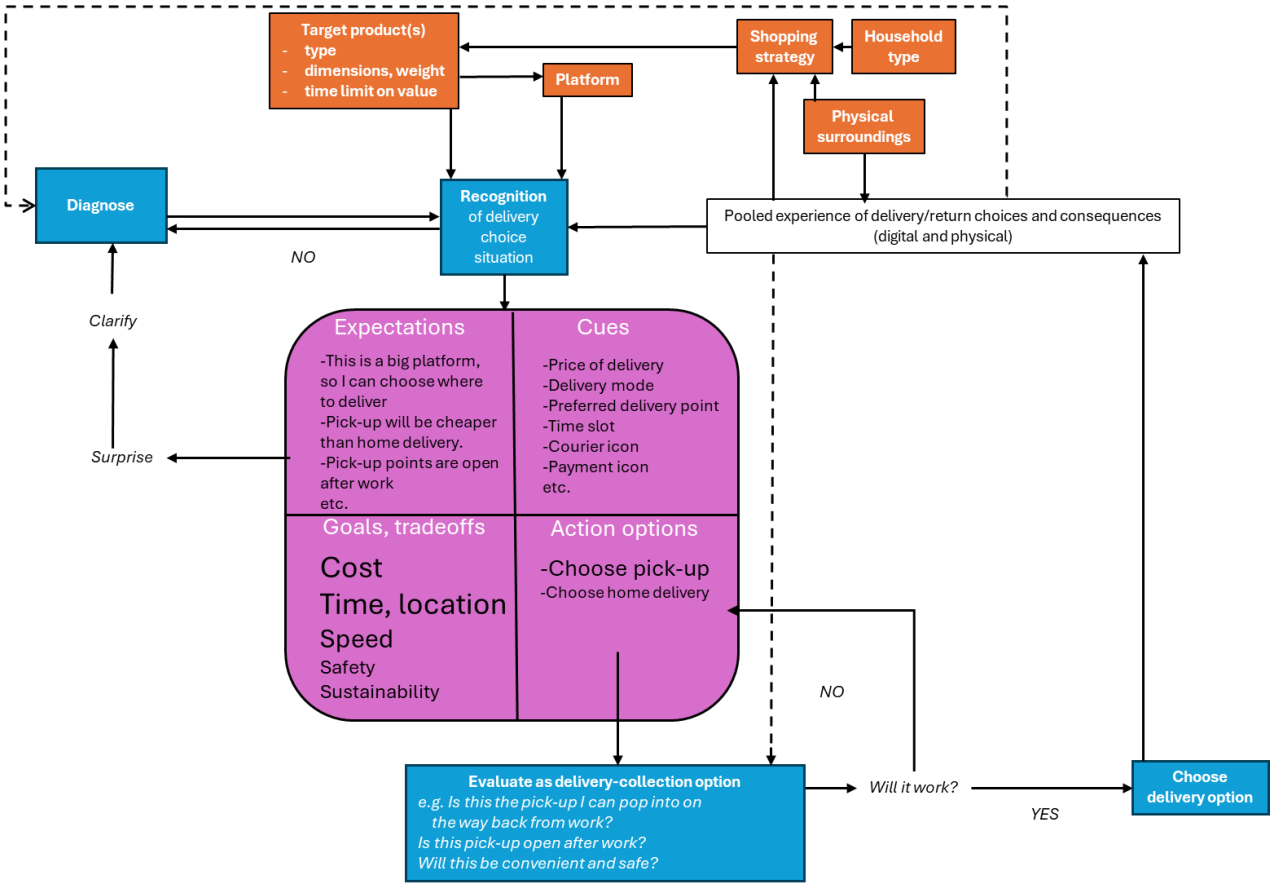
The findings suggest that real-world contexts should be accounted for when seeking to understand and influence consumer choice of delivery option. Analysis of responses revealed the complexity of contexts that influence recognition of delivery choice situations. First, by determining the frequency and variety of online shopping platforms used, consumers’ shopping strategies will influence recognition of delivery choice situations and ultimately how choices are made. A consumer’s shopping strategy will depend on their physical surroundings (e.g. which shops are nearby, distance from house to postbox), household situation (e.g. families) and the nature of previous physical and digital shopping experiences. As well as influencing shopping strategy, physical surroundings also influence evaluation of delivery-collection options. The model in Figure 2 has been developed further to illustrate this, as shown in Figure 4. In attempting to influence delivery choice, there is therefore a need to consider ways in which the unique contexts of consumers shape decisions to shop online and constrain or enable choice of sustainable delivery-collection options. Ways in which shopping strategies and physical surroundings could cluster to create different contexts for online delivery choice is an interesting line of enquiry for future research.

Accepting that delivery choices are made largely in line with the Recognition-Primed Decision model in Figure 2, an important question is, *what is it that consumers recognize?* In our interviews there were instances in which recognition of familiar platforms triggered rapid delivery decisions, but also of cognitive strategies that could be applied across platforms. Given that delivery options presented by different online platforms have common features, it is likely that consumers recognize not just delivery choice interfaces they have encountered before, but “delivery choice situations” presented by new platforms.

In line with Figure 2 there was evidence of cues, expectancies, surprises and goals emerging from participants’ accounts of retrospective incidents and real-time delivery choices in think-aloud exercises.

Figure 4 lists main goals that recognition seems to trigger, as well as examples of cues and expectations.

Figure 4: Recognition-primed choice of delivery options by consumer



8.2 Elements of delivery choice: goals, cues, expectations

In line with previous studies, cost and convenience (timepoint, timing, precision and location of delivery) seem to be prioritized and choices involve trading off cost and convenience. Speed was important where the value of the product being delivered was perceived as time-sensitive (e.g. birthday gifts, perishables, immediate gratification). Safety and sustainability were prioritized less. Safety concerns centred around the courier (reliability, intact delivery of the parcel) or location of the pick-up. Participant willingness to prioritize the speed and safety of delivery depended often on cost. Some participants mentioned they could be willing to choose sustainable options but not if they cost more and only if convenience was reduced to a limited extent.

Motivating consumers to choose sustainable delivery by addressing goals is considered by Pernot et al. (2025), but cues and expectations can also be considered when attempting to influence consumer choice of delivery option. Eco-labels are a directly recognizable cue for the sustainable consumer, but sustainable options should also provide clearly recognizable cues that address other consumer goals. Consumer understanding would be assisted by standard symbols for different delivery modes across platforms. Delivery option expectations should be understood and met, and if violated, the consumer should be able to understand why. It is also worth considering what expectations consumers should ideally have about the sustainability of different delivery modes and what cues can be used to confirm this.

8.3 Consumers lose control during physical delivery

Based on accounts of participant incidents, most delivery challenges concern the digital and verbal communications of the carrier and the physical delivery process. An experience of loss of control pervaded participant stories. Despite access to carrier-consumer communications technology, consumers expressed frustration at losing awareness of delivery status due to lack of / confusing / bundled carrier communications. Although tracking apps are available, they often fail to tell consumers what will happen next. Even when communications are successful, consumers can still experience lack of control over the timing or location of deliveries. This becomes especially clear when things don't go as planned for the carrier. In such cases consumers don't want to know what has happened or what is happening – they want to know and be able to influence what will happen next in terms of timing and location of delivery. Interestingly, the few problems reported relating to online choice of delivery also concerned lack of control of timing and location of delivery and returns. Consumer control over delivery and return can be a challenge for sustainable delivery, but if ways can be found to give consumers a way to control the timing or location of deliveries beyond the initial request made online, it could increase their chances of success.

8.4 Delivery interfaces should be improved

Participant comments in think-aloud exercises suggest several user interface challenges to choice of delivery option related to control, transparency and usability. Participants were dissatisfied when they could not choose the time and place of delivery or when time slots were inflexible. They were especially dissatisfied with being forced to choose express delivery, pick-up points, carrier or unreasonably expensive delivery options. They wanted transparency of product location, delivery costs and return processes, pricing structures and new delivery modes. They felt usability was poor when information was missing (e.g. time of arrival), inaccurate (e.g. pick-up opening times), misleading, distracting or hard to understand. They were confused by lack of standard terms for pick-up modes and multiple delivery and pick-up methods offered at once, especially when similar in functionality but different in cost. Users could struggle to select the most convenient pick-up point, as no map was available, or available maps were hard to navigate. Some delivery options did not consider the users wanting to deliver to work or asked users to choose pick-up points that were further away from the user's home than the seller's store. Some users seemed overwhelmed by too many delivery options and confusing paths through the ordering process. Users also express frustration and can want to leave the website if delivery charges are applied inconsistently or in a misleading way. These challenges should be considered by those promoting sustainable delivery options, especially if they could cause consumers to overlook new delivery options. Lessons can also be learned from product interface designs, e.g. the use of pictures, filters, symbols, features that allow consumers to envisage the product in use. Ways to integrate sustainable delivery choice into the product interface could also be considered.

8.5 Promoting sustainable delivery choice

Based on participants and sites selected for this study, sustainability appears to play only a minor role in consumer choice of delivery option today. Participants did not prioritize sustainability, and it was not highly visible on delivery platforms. Despite knowing how delivery took place, most participants had limited and inconsistent mental models about sustainability challenges that online delivery presents (Annex G, H). Only 8 of 22 participants identified vehicle emissions as a challenge caused by online deliveries.

Based on the think-aloud exercises and platforms used, sustainability is not integrated into delivery option choice to the same extent as cost, time and location. Given that consumers can only decide based on the choice presented, the digital environments could be said to promote an attitude-behaviour disconnect. In other words, people who value sustainability may not be able to choose sustainable options because the platforms provide little information on which to base such a choice. When prompted, motivated users seemed to be able to make educated guesses about the differences between options (e.g. wider time slots more sustainable than narrow time slots; pick-up options more sustainable than home delivery; standard more sustainable than express delivery), but most users wanted more transparency on the sustainability of different options. There is an opportunity for platforms to give consumers more information on product source, packaging, type of vehicles that will be used to

deliver (electric van, cargo bike), expected emissions, energy use, carbon footprints for different delivery options or quality of carrier used. Providing information on the sustainability of pick-up options, however, could be challenging, with consumers recognizing that to know the sustainability of a pick-up options they would need to know not only how they would get to the collection point but how other consumers would do so. Several participants attested to the complexity involved in knowing which delivery options would be most sustainable. Real-time data or complex calculations may not be required to know the sustainability of home delivery options, with most participants appreciating eco-label messages used on more sustainable home delivery time slots. Thus, informing consumers of the sustainability *intention* of a delivery option might be sufficient to increase the extent to which consumers choose it. Three of the platforms in the simulations used such eco-labels, but they seemed to mean different things (e.g. “we deliver to neighbours at this time”, “we drive less km”, “we can consolidate orders”). Standardization and clarity on use of labels and their meaning could help consumers identify sustainable options.

In addition to eco-labels, consumers identified several ways in which sustainable delivery choices could be promoted by online platforms, e.g. give delivery options sustainability ranking, inform consumers about the benefits of delaying an order by a day or two, tell consumers where parcel lockers are and how they work, and consider the role of umbrella platforms like prisjakt.no. It could also be effective to raise awareness using measures that transcend platforms and physical delivery, e.g. use of standard sustainability icons on delivery vans, packaging, carrier interface and delivery choice interface. Awareness of pick-up points or cargo bike delivery could also be promoted across the digital and physical delivery ecosystem, and standard symbols could help here too. Knowing which stationary or mobile pick-up point locations satisfy the goals of most inhabitants (including safety) could also lead to more consumers to choose pick-up as a delivery option. The same points could be used as channels for returning goods efficiently.

8.6 Addressing the attitude-behaviour disconnect

Use of a real-world approach to understanding consumer choice results in an apparent disconnect between attitude or awareness on the one hand and sustainable delivery choice behaviour on the other. This aligns with observations made in other studies of consumer sustainability behaviour. Many participants expressed that the delivery choices they made before sustainability was discussed, were poorly aligned with their actual sustainability awareness or attitudes. When asked to choose a sustainable delivery option, participants found it hard to down-prioritize cost and convenience. Marketing efforts, choice architecture (e.g. home delivery as default), lack of information on the digital platform, and participant goals, expectations and habits could all contribute to participants’ less sustainable delivery choices. In the real world, living contexts and shopping strategies will also play a role, e.g. the consumer who values sustainability may be forced to choose home delivery because they live far from a pick-up point, they have never used a parcel locker, or they use smaller sites lacking resources to offer pick-up options. The results presented here add the possibility that consumers may miss new or alternative options when their decisions are instinctive and recognition-primed. To counter this challenge, web designers could find ways to interrupt automated choices and engage consumers in alternative options.

8.7 How do consumers differ?

Ability to pick up parcels or collect in shops depends on familiarity with surroundings, time spent at home, type of abode, proximity to pick-up points to home or oft-travelled routes and availability of pick-up in shops frequented. In developing personas for targeting of behavioural change strategies, it could therefore be important to account for physical surroundings as a constraint on collection strategies. The sustainability profiles in Annex G and preferred collection strategies in

Table 3 should also prove useful input for the creation of personas. The relative prioritization of cost versus convenience can be important to attend to, as participants seemed less willing to sacrifice cost than convenience to gain sustainability. The study identifies several other potentially important variables, such as shopping strategy (products ordered online), type of platforms used, online shopping strategies (e.g. use of umbrella platforms, “one-click” ordering), frequency of use, suitability of workplace as a delivery location, marketing-susceptibility, need for express delivery, or trust in eco-labels or other sustainability information.

8.8 Study limitations

A main aim for this explorative study has been to find ways to influence choice of delivery option in real-world situations by conceptualizing online delivery choices by consumers as naturalistic. The finding that consumer decisions are indeed heavily recognition-primed should be confirmed in a study in which the frequency of comparative versus singular evaluations is quantified and coding reliability verified. Readers should note that this study has not explored directly how individual-level consumer characteristics such as mobility, limited movement capacity or access to transport can also act as barriers to choosing a sustainable delivery option and account for the attitude-behaviour disconnect. A recognized limitation of qualitative studies such as this is that participants are limited in the extent to which they represent the “last-mile populations” of the countries or cities involved. Ideally, more teenagers and people over 60 years old would have been included in this study, as these segments also shop online and may have different use patterns.

References

Bellini-Leite, Samuel C. 2022. «Dual Process Theory: Embodied and Predictive; Symbolic and Classical». Frontiers in Psychology 13. doi: 10.3389/fpsyg.2022.805386.

Bosona, T. (2020). Urban freight last mile logistics – Challenges and opportunities to improve sustainability: a literature review. Sustainability 2020, 12(21), 8769. https://doi.org/10.3390/su12218769

Caspersen, E. and Navrid, S. 2021. The sharing economy and consumer preferences for environmentally sustainable last mile deliveries. Transportation Research Part D: Transport and Environment. 95, June 2021, 102863.

Caspersen, Elise, Ståle Navrud, og Jens Bengtsson. 2022. «Act locally? Are female online shoppers willing to pay to reduce the carbon footprint of last mile deliveries?» International Journal of Sustainable Transportation 16(12):1144–58. doi: 10.1080/15568318.2021.1975326.

Crandall, Beth, Gary Klein, og Robert R. Hoffman. 2006. Working Minds. A Practitioner's Guide to Cognitive Task Analysis. Cambridge, MA: MIT Press.

Davydenko, I. Y., og W. M. M. Hopman. 2020. Effect of Pick-Up Points and Returns on CO2 Emissions in Last Mile Parcel Delivery Networks. 877425. Den Haag The Nethlerlands: TNO.

Esper, Terry L., Thomas D. Jensen, Fernanda L. Turnipseed, og Scot Burton. 2003. «THE LAST MILE: AN EXAMINATION OF EFFECTS OF ONLINE RETAIL DELIVERY STRATEGIES ON CONSUMERS». Journal of Business Logistics 24(2):177–203. doi: 10.1002/j.2158-1592.2003.tb00051.x.

Fiorello, Davide, Agrippino Gulizia, Edoardo Repetto, Claudia de Stasio, Giuseppe Galli, og Angelo Martino. 2025. Delivery options analysis framework. Deliverable 1.1 from EU Project CodeZERO. TRT Trasporti e Territorio Srl.

EEA, 2024. Sustainability of Europe's mobility systems. Web report no. 01/2024. EN HTML: TH-01-24-007-EN-Q - ISBN: 978-92-9480-683-3 - doi: 10.2800/8560026

Flach, John, og Fred Voorhorst. 2020. A meaning processing approach to cognition. London, England: Routledge.

Goodrich, Michael A., Wynn C. Stirling, og Erwin R. Boer. 2000. «Satisficing Revisited». Minds and Machines 10(1):79–109. doi: 10.1023/A:1008325423033.

Gossen, Maike, Sebastian Jäger, Marja Lena Hoffmann, Felix Bießmann, Ruben Korenke, og Tilman Santarius. 2022. «Nudging Sustainable Consumption: A Large-Scale Data Analysis of Sustainability Labels for Fashion in German Online Retail». Frontiers in Sustainability 3. doi: 10.3389/frsus.2022.922984.

Grummon, Anna H., Anna Claire Tucker, Violet Noe, Pasquale E. Rummo, Carmen E. Prestemon, Marissa G. Hall, Lindsay M. Jaacks, Veronica Lippuner, og Lindsey Smith Taillie. 2023. «Consumer behaviour and experiences in a naturalistic online grocery store: implications for nutrition research». Journal of Nutritional Science 12:e36. doi: 10.1017/jns.2023.21.

Hoffman, R. and Militello, L. 2009. Perspectives on Cognitive Task Analysis: Historical Origins and Modern Communities of Practice. NY: Taylor & Francis Group.

Kader, Mohammad Shahidul, Md Rashaduzzaman, Xiao Huang, og Seeun Kim. 2023. «Influencing factors toward e-shoppers' adoption of green last-mile delivery». International Journal of Retail & Distribution Management 51(2):220–37. doi: 10.1108/IJRDM-10-2021-0480.

Klein, Gary. 2008. «Naturalistic Decision Making». Human Factors 50(3):456–60. doi: 10.1518/001872008X288385.

Klein, Gary. 2017. Sources of Power: How People Make Decisions. 20th Anniversary Edition. Cambridge MA: MIT Press.

Kokkinou, Alinda, Hans Quak, Ondrej Mitas, og Albert Mandemakers. 2024. «Should I wait or should I go? Encouraging customers to make the more sustainable delivery choice». Research in Transportation Economics 103:101388. doi: 10.1016/j.retrec.2023.101388.

Luttermann, Sandra, Caroline Buschmann, Michael Freitag, Herbert Kotzab, Jonas Tiggemann, Markus Trapp, og Martin Weßling. 2021. «What is the Right Home Delivery Option for Your Online Shopping?» S. 137–50 i Logistics Management, redigert av U. Buscher, R. Lasch, og J. Schönberger. Cham: Springer International Publishing.

Miquel-Romero, Maria-Jose, Marta Frasquet-Deltoro, og Alejandro Molla-Descals. 2018. «Consumer Motivations for Click-and-Collect and Home Delivery in Online Shopping». S. 115–22 i Advances in National Brand and Private Label Marketing, redigert av F. J. Martínez-López, J. C. Gázquez-Abad, og A. Chernev. Cham: Springer International Publishing.

Ní Choisdealbha, Á., og P. D. Lunn. 2020. «Green and Simple: Disclosures on Eco-labels Interact with Situational Constraints in Consumer Choice». Journal of Consumer Policy 43(4):699–722. doi: 10.1007/s10603-020-09465-x.

Nielsen, Kristian S., Cameron Brick, Wilhelm Hofmann, Tina Joanes, Florian Lange, og Wencke Gwozdz. 2022. «The motivation–impact gap in pro-environmental clothing consumption». Nature Sustainability 5(8):665–68. doi: 10.1038/s41893-022-00888-7.

Nijssen, S.R.R., Pijs, M, van Ewijk, A. & Müller, B.C.N. (2023). Towards more sustainable online consumption: The impact of default and informational nudging on consumers' choice of delivery mode. Cleaner and Responsible Consumptions, 11, December 2023, 100135. https://doi.org/10.1016/j.clrc.2023.100135

Nisbett, Richard E., og Timothy D. Wilson. 1977. «Telling more than we can know: Verbal reports on mental processes.» Psychological Review 84(3):231–59. doi: 10.1037/0033-295X.84.3.231.

Panzone, Luca A., Alistair Ulph, Denis Hilton, Ilse Gortemaker, og Ibrahim Adebisi Tajudeen. 2021. «Sustainable by Design: Choice Architecture and the Carbon Footprint of Grocery Shopping». Journal of Public Policy & Marketing 40(4):463–86. doi: 10.1177/07439156211008898.

Pernot, Delphine, Ross O. Phillips, og Mina Saghafian. 2025. Consumers' awareness and behavioural change. EU Deliverable. Deliverable 2.3 from EU project «CodeZERO». Institute of Transport Economics (TØI).

Rajendran, Salini Devi, og Siti Norida Wahab. 2022. «Investigating last-mile delivery options on online shoppers experience and repurchase intention». International Journal of Electronic Marketing and Retailing 13(2). doi: 10.1504/IJEMR.2022.121826.

Rausch, Theresa Maria, Daniel Baier, og Stefanie Wening. 2021. «Does sustainability really matter to consumers? Assessing the importance of online shop and apparel product attributes». Journal of Retailing and Consumer Services 63:102681. doi: https://doi.org/10.1016/j.jretconser.2021.102681.

Santos, Susana, og Helena Martins Gonçalves. 2024. «Consumer decision journey: Mapping with real-time longitudinal online and offline touchpoint data». European Management Journal 42(3):397–413. doi: https://doi.org/10.1016/j.emj.2022.10.001.

Song, Li, Yechan Lim, Pengyu Chang, Yingnan Guo, Mingyu Zhang, Xi Wang, Xueying Yu, Mark R. Lehto, og Hua Cai. 2019. «Ecolabel's role in informing sustainable consumption: A naturalistic decision making study using eye tracking glasses». Journal of Cleaner Production 218:685–95. doi: https://doi.org/10.1016/j.jclepro.2019.01.283.

Szabo, Szerena, og Jane Webster. 2021. «Perceived Greenwashing: The Effects of Green Marketing on Environmental and Product Perceptions». Journal of Business Ethics 171(4):719–39. doi: 10.1007/s10551-020-04461-0.

Theotokis, Aristeidis, og Emmanouela Manganari. 2015. «The Impact of Choice Architecture on Sustainable Consumer Behavior: The Role of Guilt». Journal of Business Ethics 131(2):423–37. doi: 10.1007/s10551-014-2287-4.

Tokar, Travis, Brent D. Williams, og Brian S. Fugate. 2020. «I Heart Logistics—Just Don't Ask Me to Pay For It: Online Shopper Behavior in Response to a Delivery Carrier Upgrade and Subsequent Shipping Charge Increase». Journal of Business Logistics 41(3):182–205. doi: 10.1111/jbl.12239.

Valenčič, Eva, Emma Beckett, Clare E. Collins, Barbara Koroušić Seljak, og Tamara Bucher. 2023. «Digital nudging in online grocery stores: A scoping review on current practices and gaps». Trends in Food Science & Technology 131:151–63. doi: https://doi.org/10.1016/j.tifs.2022.10.018.

Verplanken, Bas, og Lorraine Whitmarsh. 2021. «Habit and climate change». Current Opinion in Behavioral Sciences 42:42–46. doi: https://doi.org/10.1016/j.cobeha.2021.02.020.

Vrain, E., C. Wilson, L. Kerr, og M. Wilson. 2022. «Social influence in the adoption of digital consumer innovations for climate change». Energy Policy 162:112800. doi: https://doi.org/10.1016/j.enpol.2022.112800.

Williamson, Janis, Rob Ranyard, og Lisa Cuthbert. 2000. «A conversation-based process tracing method for use with naturalistic decisions: An evaluation study». British Journal of Psychology 91(2):203–21. doi: https://doi.org/10.1348/000712600161790.

Ward, Paul, and others (eds), *The Oxford Handbook of Expertise*, Oxford Library of Psychology (2019; online edn, Oxford Academic, 9 Oct. 2018), https://doi.org/10.1093/oxfordhb/9780198795872.001.0001, accessed 15 Jan. 2025.

World Economic Forum. 2020. The Future of the Last-Mile Ecosystem. https://www.weforum.org/publications/the-future-of-the-last-mile-ecosystem/. Accessed 31.1.25

Annex A: Sociodemographic questions

Age group

☐ 18-30
☐ 31-40
☐ 41-50
☐ 51-60
☐ 61-70
☐ 71-80
☐ 81+ years old

Gender

☐ Female
☐ Male
☐ Prefer not to disclose / Other

Type of residential area

☐ City center
☐ Suburb outside the city center or on outer edge of the city
☐ Small town or residential area outside the city
☐ Rural area
☐ Other:

Household type

☐ Single without children
☐ Single with one or more children
☐ Couple without children
☐ Couple with one or more children
☐ Other

Education level:

☐ High school
☐ Bachelor's degree
☐ Master's degree
☐ Doctorate
☐ Other technical, college education or apprenticeship
☐ Prefer not to disclose / None

Annex B: Participant attributes

No.	Country	Type of interview	Age group	Gender	Residential area	Household type	Education level	Online shopping frequency
1	BE1	Retrospective	31-40	F	City centre	Couple	PhD	++
2	BE2	Retrospective	18-30	M	Suburban	Couple + child(ren)	Master's	+
3	BE3	Retrospective	31-40	M	City centre	Single	Master's	+
4	BE4	Retrospective	51-60	F	City outskirts	Single	Diploma	++++
5	BE5	Retrospective	18-30	F	City centre	Single	Bachelor's	+++
6	IT1	Retrospective	41-50	F	Suburban	Couple	Bachelor's	++++
7	IT2	Retrospective	18-30	M	City centre	Lives with parent(s)	School	++
8	IT3	Retrospective	41-50	M	Suburban	Couple	Other	+++
9	IT4	Retrospective	41-50	M	Suburban	Single	Other	++
10	IT5	Think-aloud	18-30	F	City centre	Couple + child(ren)	Master's	++++
11	NL1	Retrospective	18-30	F	Suburban	Couple	Master's	+++
12	NL2	Retrospective	31-40	M	Suburban	Single	Master's	++
13	NL3	Retrospective	31-40	F	City centre	Couple + child(ren)	Master's	+++
14	NL4	Think-aloud	31-40	M	City centre	Couple + child(ren)	Bachelor's	++++
15	NL5	Retrospective	18-30	F	Suburban	Single	Master's	++
16	NO1	Retrospective	41-50	F	Suburban	Couple + child(ren)	Bachelor's	++++
17	NO2	Retrospective	71-80	F	City centre	Single	Other	+
18	NO3	Retrospective	31-40	F	Suburban	Single	Master's	++
19	NO4	Retrospective	41-50	M	Suburban	Couple + child(ren)	High school	++
20	NO5	Retrospective	51-60	F	Suburban	Single + child(ren)	Bachelor's	+
21	NO6	Think-aloud	51-60	F	City centre	Single + child(ren)	High school	++
22	NO7	Think-aloud	41-50	F	Suburban	Couple + child(ren)	Master's	+++

+ once a month

++ one to three times a month

+++ once or twice a week

++++ more than twice a week

Annex C: Interview schedule

PART i: Context and retrospective incident analysis

1. Please start by telling me a bit about your online shopping experience:
   a. How often do you shop online? (At least once a week / At least once a month / Less than once a month / Never)
   b. What kind of things do you buy?
   c. Why do you shop online?
   d. Which platforms do you tend to use and why?
   e. Do you tend to use a PC or a mobile phone when you order online?
   f. How are the items you buy usually delivered? Do you usually choose the delivery method?
   g. Can you tell me about your experience with returning items purchased online?

2. When you shop online, what's important to you?
   — *What are you trying to do?*
   — *What are your goals?*

3. Do you remember the last time you made an online purchase? Think about that as you answer the following questions:
   a. Please tell me a story about what happens when you make an online purchase – from the first thought of deciding to buy online to when you receive the items in your hands: what steps do you follow?
   b. Which of these steps is the hardest for you, the one where you're most unsure or have the most difficulty deciding?
   — *What are you trying to do at this step?*
   — *What do you need to decide?*
   — *How do you make this decision? What information do you use?*
   — *What makes this step difficult? How do you feel confused or uncertain?*
   — *How do you manage this difficulty?*
   — *What information would help you improve this step?*

4. When you buy the product you buy most often online, what delivery options do you normally have to choose between?

5. Now, I would like you to tell me as much as possible about how you choose a delivery option. Tell me a story about what happens.
   — *Use the probes from question 3.*

6. What do you think happens from the moment you order the product you buy most online until it reaches your hands?
   — *What do you think is involved?*
   — *Who do you think does what to get the product to you?*

7. Challenges:
   a. What kind of challenges do you think delivery represents for those who deliver products?
   b. What kind of challenges do you think delivery represents for society?
   c. What kind of challenges do you think returns represent for society?
   d. What kind of challenges does delivery represent for you?
   e. What kind of challenges does returning products represent for you?

PART ii Think-aloud simulation (example)
[…] = instructions for the interviewer

1. **Ikea**
   https://www.ikea.com/it/it/
   • Please tell us about any previous online shopping experiences with Ikea?
   • What are your expectations regarding delivery options here?
   [Choose “Mittzon table”]
   [Add to cart]
   [Continue as a guest for delivery options]
   [Ask the participant to describe what they notice and what it means to them while learning and choosing between the delivery options. NB there are often delivery details before reaching the delivery options, so it's worth asking "Do you see anything or have any thoughts about the delivery here?"]

2. **Zalando**
   www.zalando.it
   • Tell us about any previous online shopping experiences with Zalando?
   • What are your expectations regarding delivery options here?
   [Ask the participant to choose a jacket they like]
   [Ask the participant to describe what they notice and what it means to them while learning and choosing between delivery options. NB there are often delivery details before reaching the delivery options, so it's worth asking, "Do you see anything or have any thoughts about the delivery here?"]

3. **Esselunga** [if there’s time and only if the participant can share their screen]
   https://www.esselunga.it/it-it/homepage.html
   [The procedure is the same as Zalando]

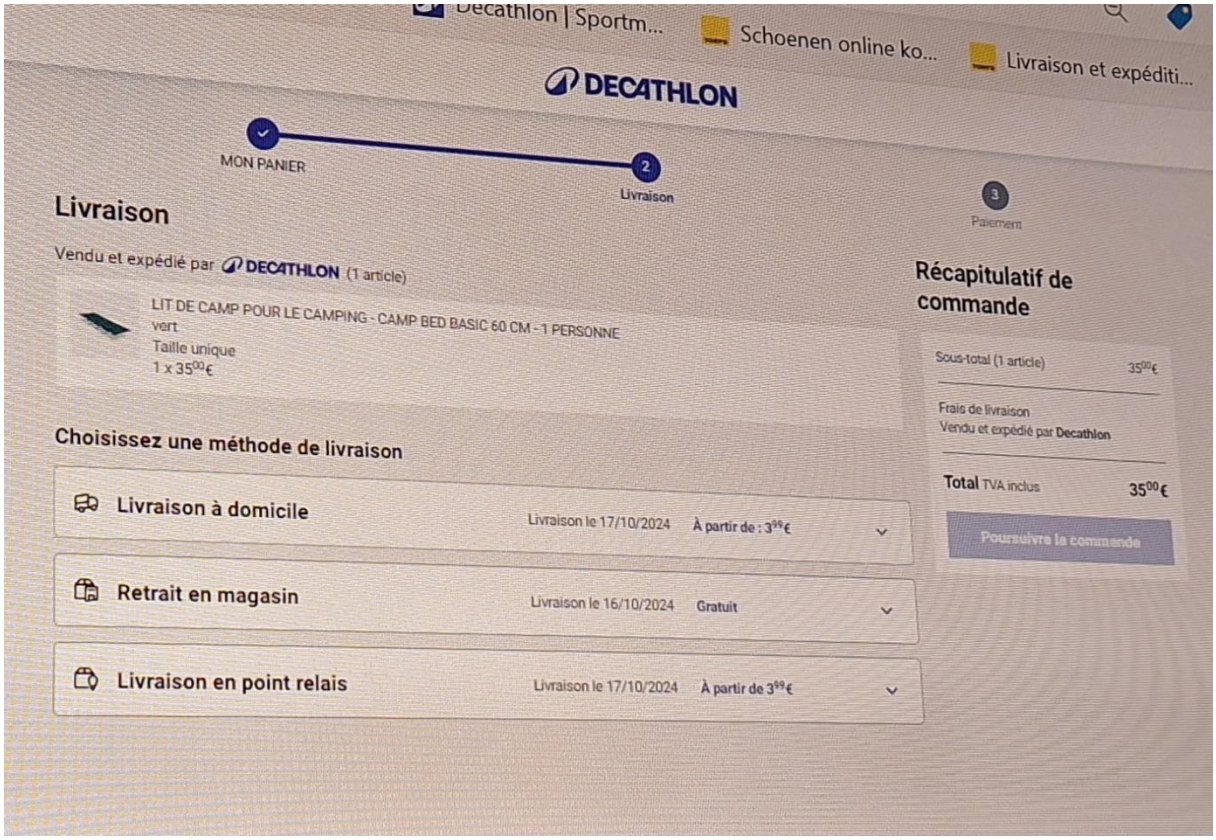
4. What does a “sustainable delivery option” mean to you? How does it differ from conventional delivery options?

5. For us a “sustainable delivery option” means a way of delivering your product that does not harm society in the short or long term. For example, it could be more eco-friendly, offer fairer working conditions, support local businesses, or be safer compared to traditional delivery methods. Now, imagine you want to choose a sustainable delivery option that you would be satisfied with, as you explore the platforms in reverse order. Again, speak out loud and tell me what you're looking at, what you notice, and what it means to you, as much as possible. Tell me what you’re thinking as you use the platform. What are you noticing and what does it mean to you?

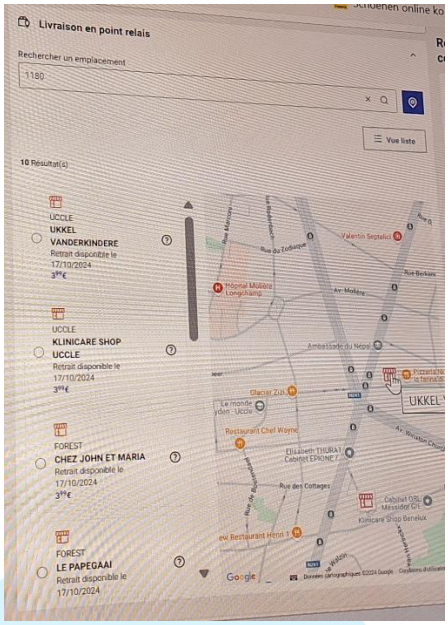
6. Which delivery options are the most and least sustainable?
   — *What makes you think this?*
   — *Do you have enough information to decide?*
   — *What other information would you like to have to make a decision?*

Annex D: Examples of online delivery options

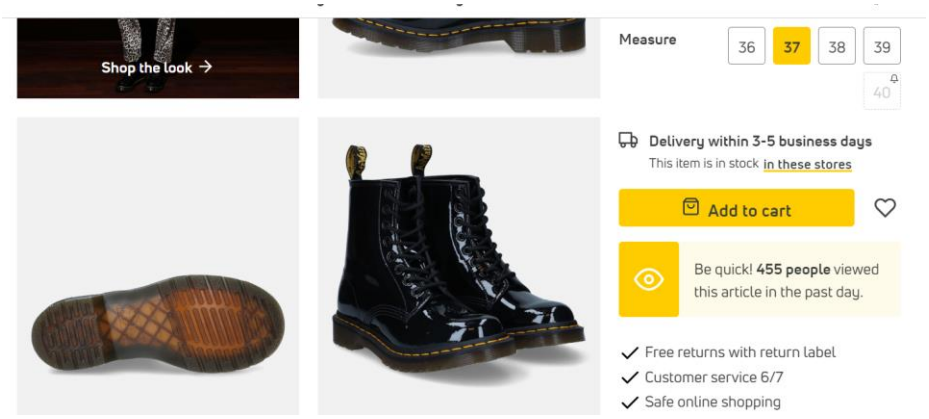
Decathlon.be



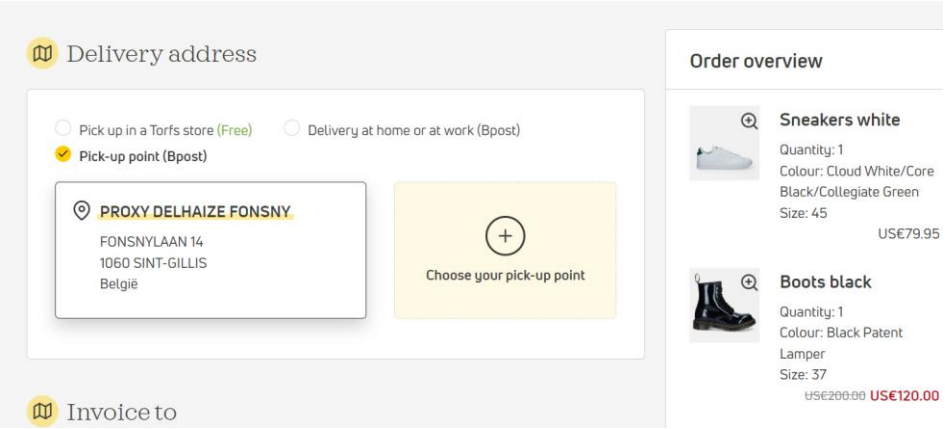
After clicking on collect from pick-up point (Livraison en point relais):



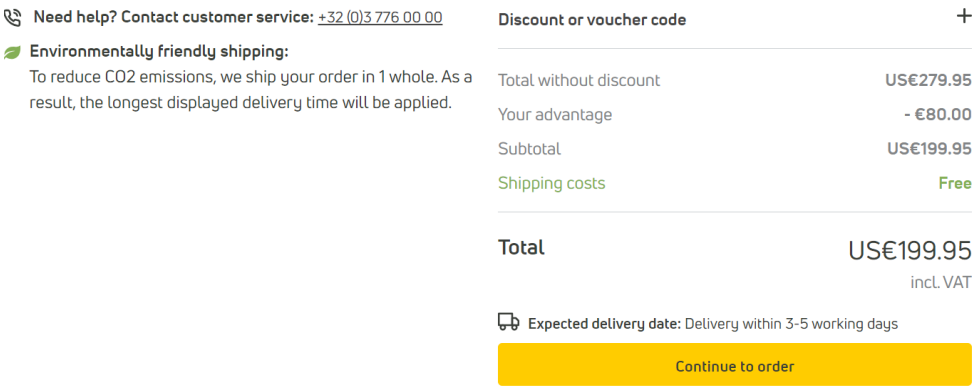
Torfs.be



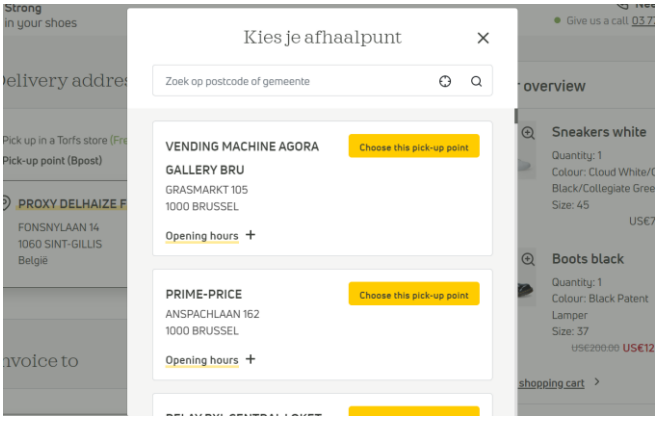
After adding to cart, click on “Continue to order” and delivery default set to pick-up not at home or work:



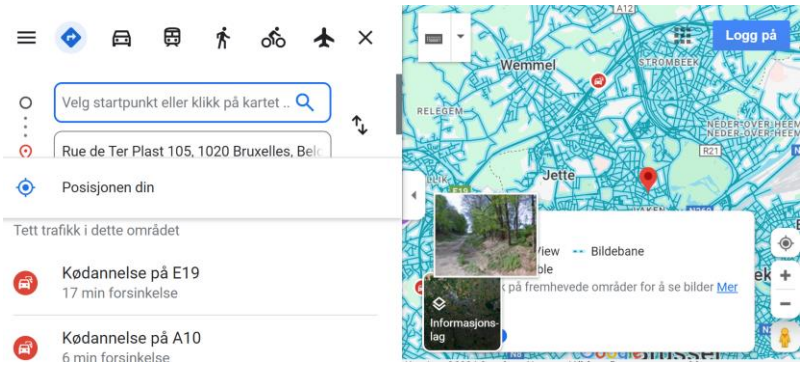
Note that on choosing 2 products the following is displayed about consolidation, but participants were asked to select only one pair of shoes:



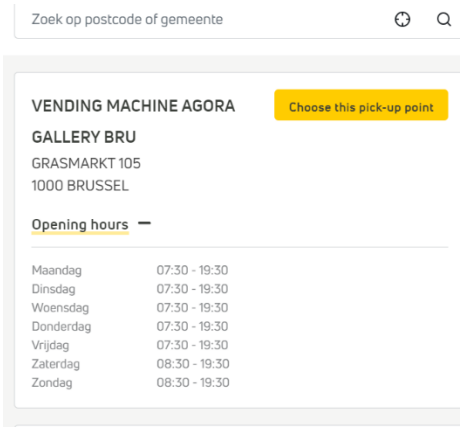
Click on Choose your pick-up point you enter postcode here to get relevant ones:



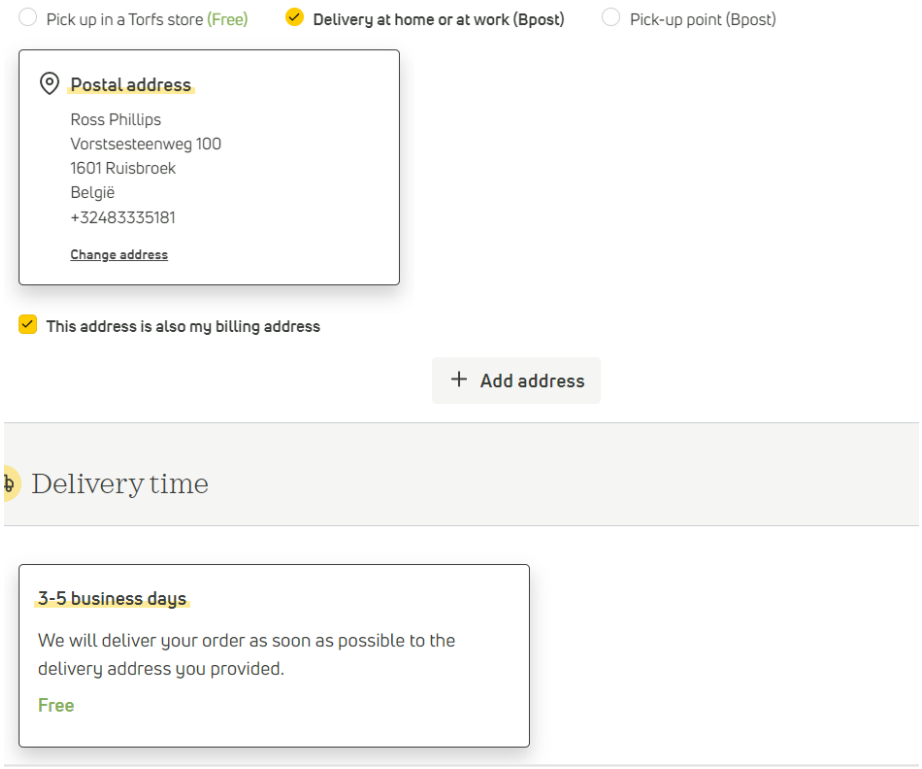
Click on an address, you get taken to a google maps-like page:



Click on opening hours:



Going back and choosing “Delivery at home or work” you get:



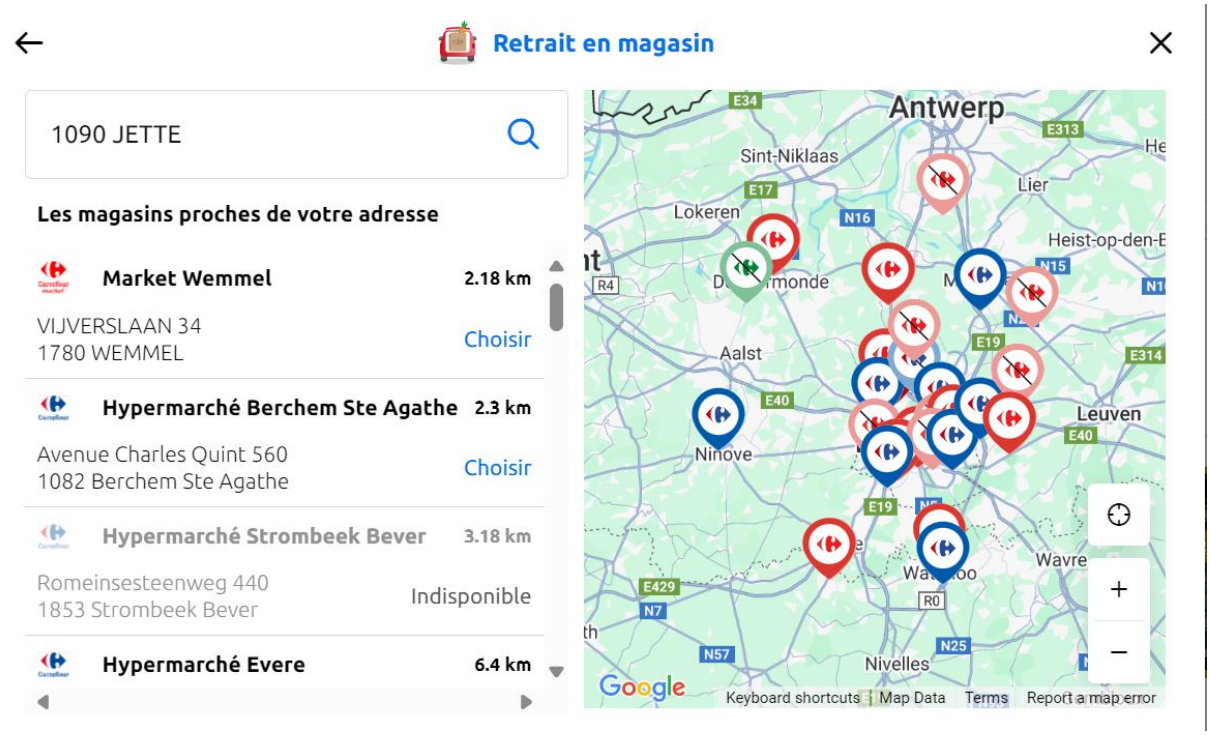
Choose a store, you get similar map-based choice of Torf store near you – works same as pick-up point.

Carrefour.be

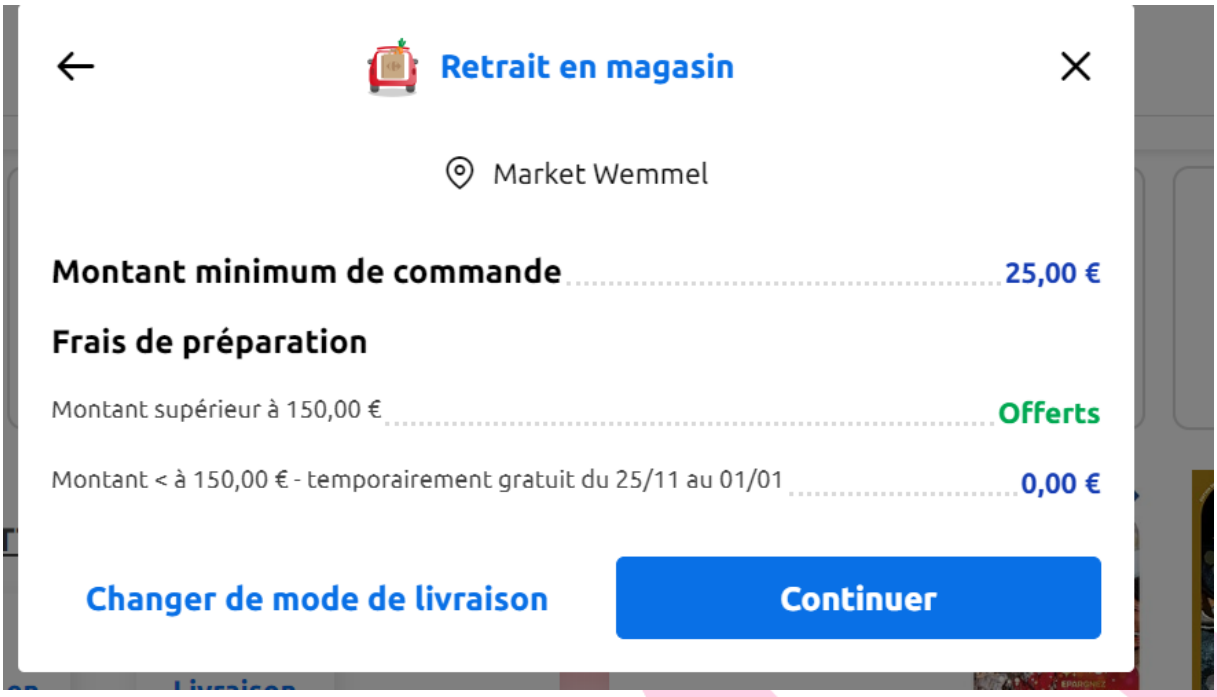
This info available on front page of Carrefour – you have to just enter a postcode

If you click on home delivery (Livraison a domicile):

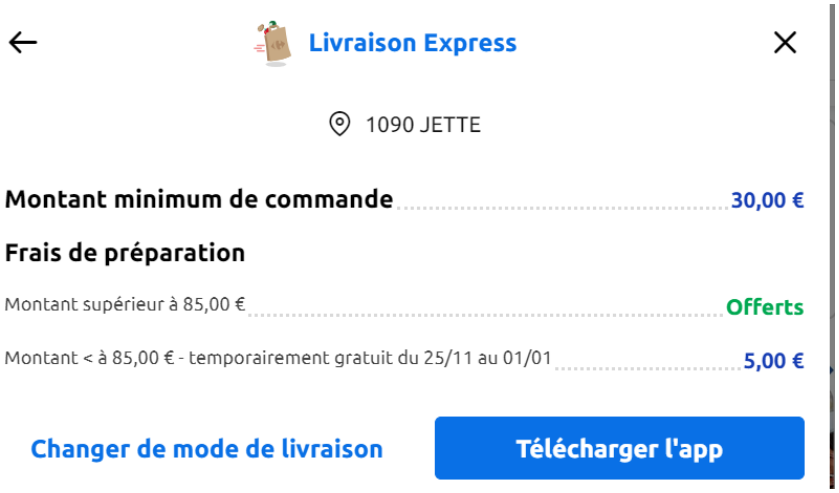
If you click on Collect from the seller's store (Retrait en magasin):



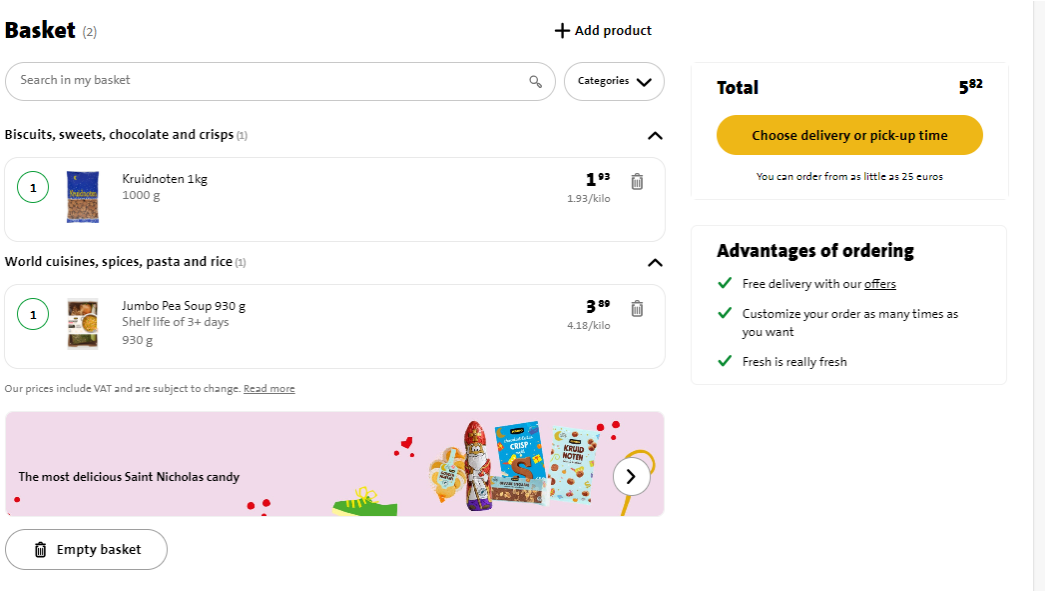
And then you click Choose (Choisir) to get:



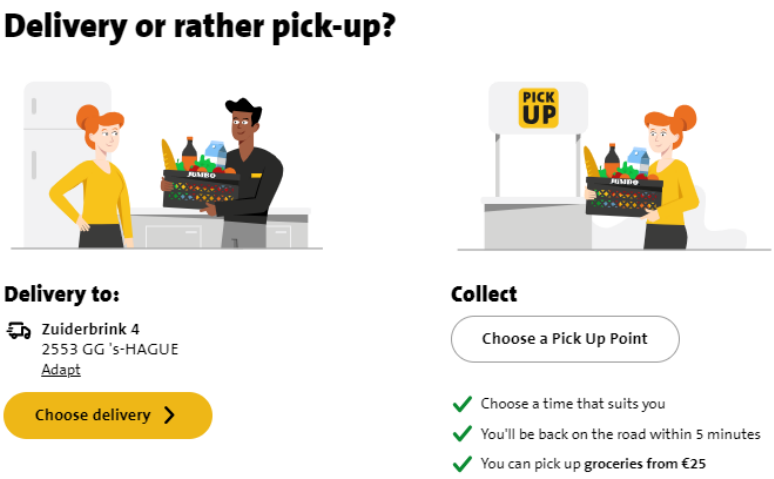
And on Express delivery (Livraison express):


Livraison Express
1090 JETTE
Montant minimum de commande
30,00 €
Frais de préparation
Montant supérieur à 85,00 €
Offerts
Montant < à 85,00 € - temporairement gratuit du 25/11 au 01/01
5,00 €
Changer de mode de livraison
Télécharger l'app

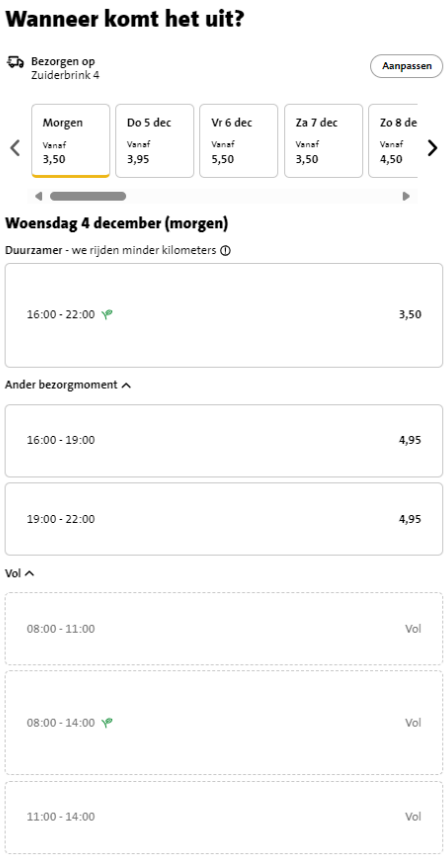
jumbo.com



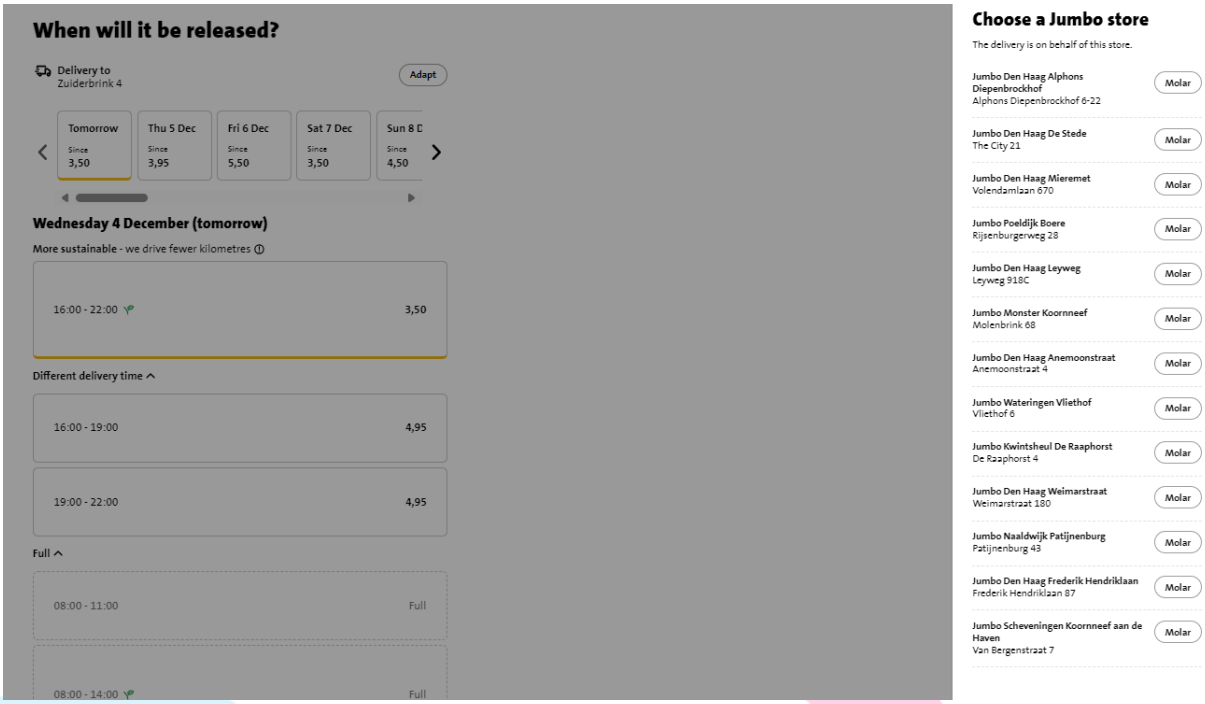
Click on “choose delivery or pick-up time”:



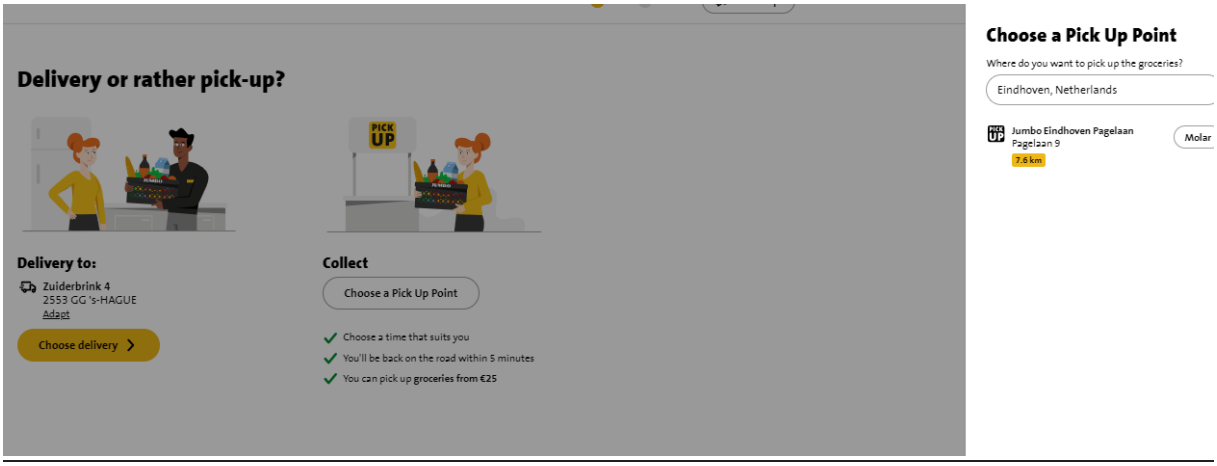
Home delivery is set as default. Click on “Choose delivery”:



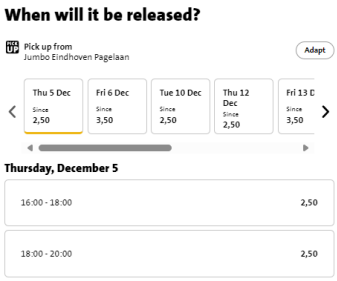
If you click on a timeslot you get “choose a jumbo store”:



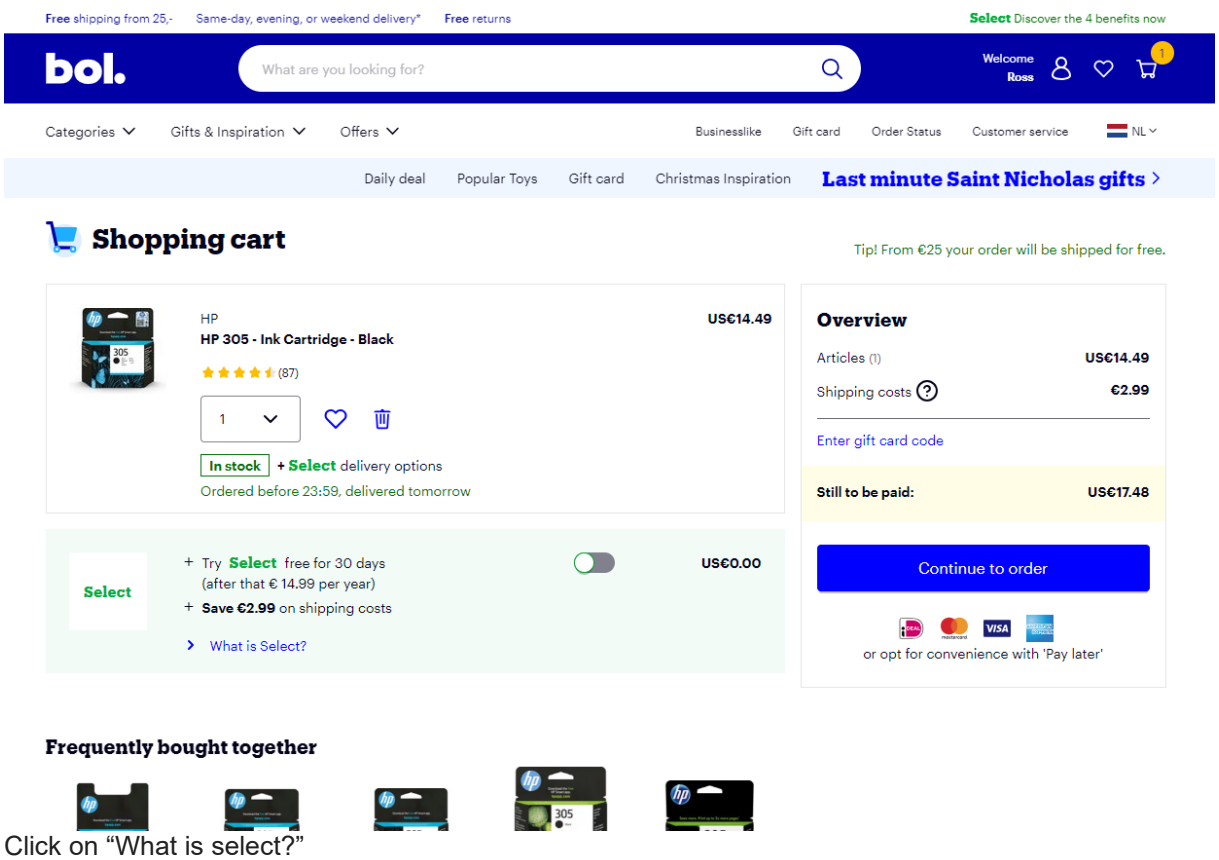
Going back to “Choose a Pick up point”- you get to put in your city. There don’t appear to be too many options e.g. put in “The Hague” get no options, put in “Eindhoven”, get:



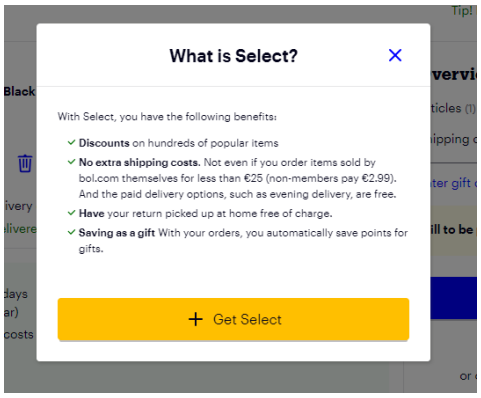
Click on “Molar” get:



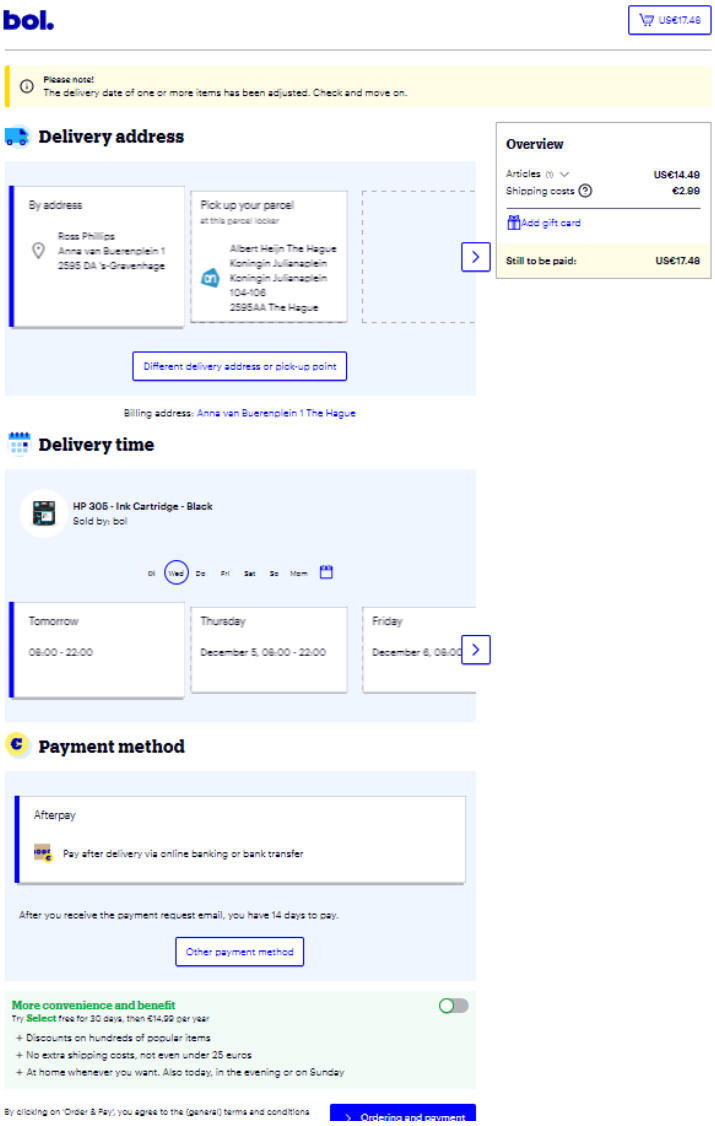
bol.com



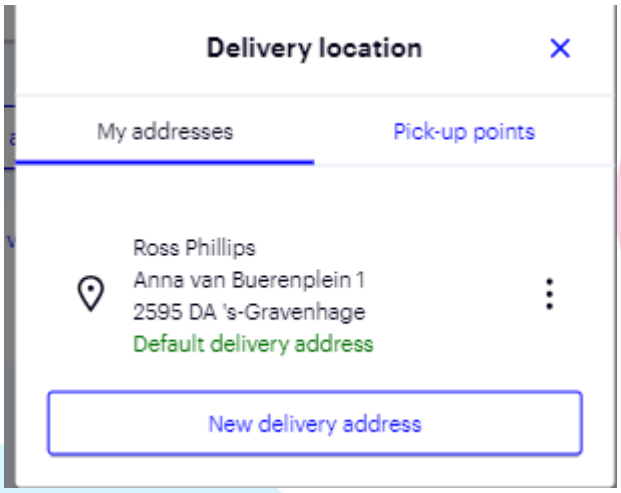
Click on “What is select?”



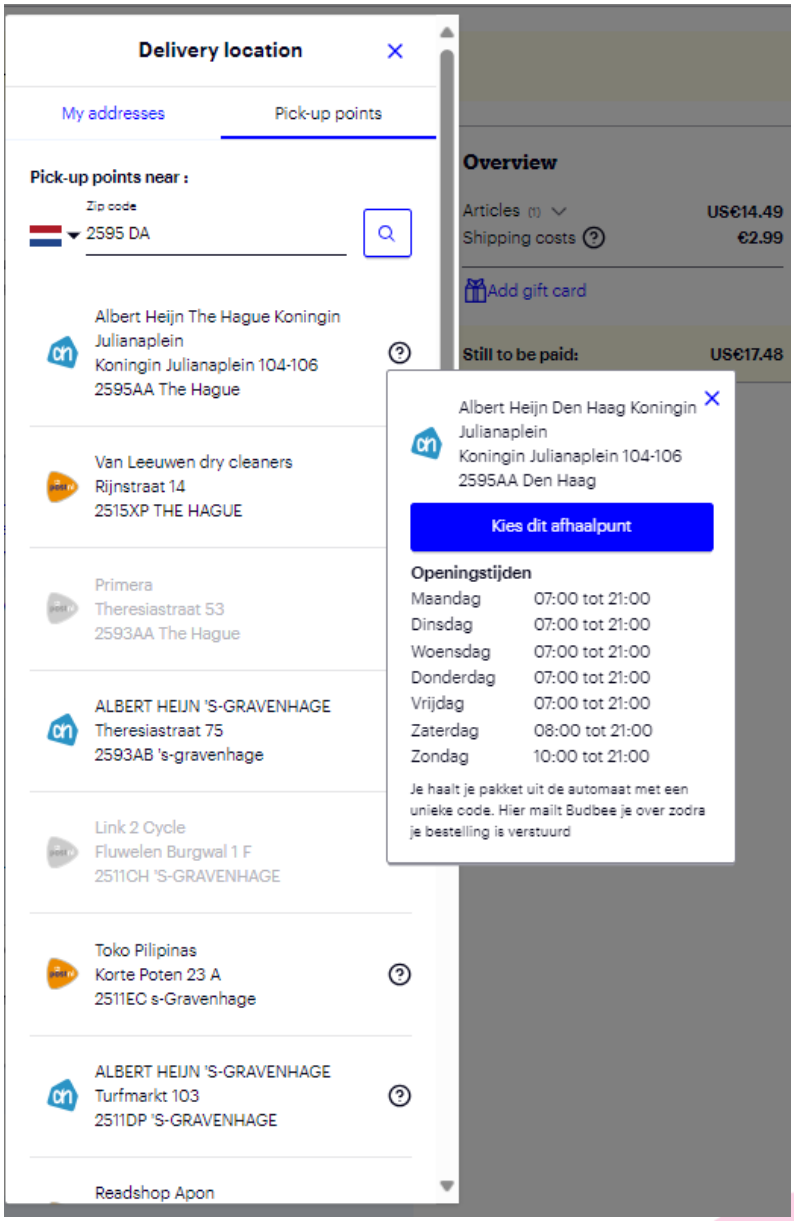
Click on “Continue to order”



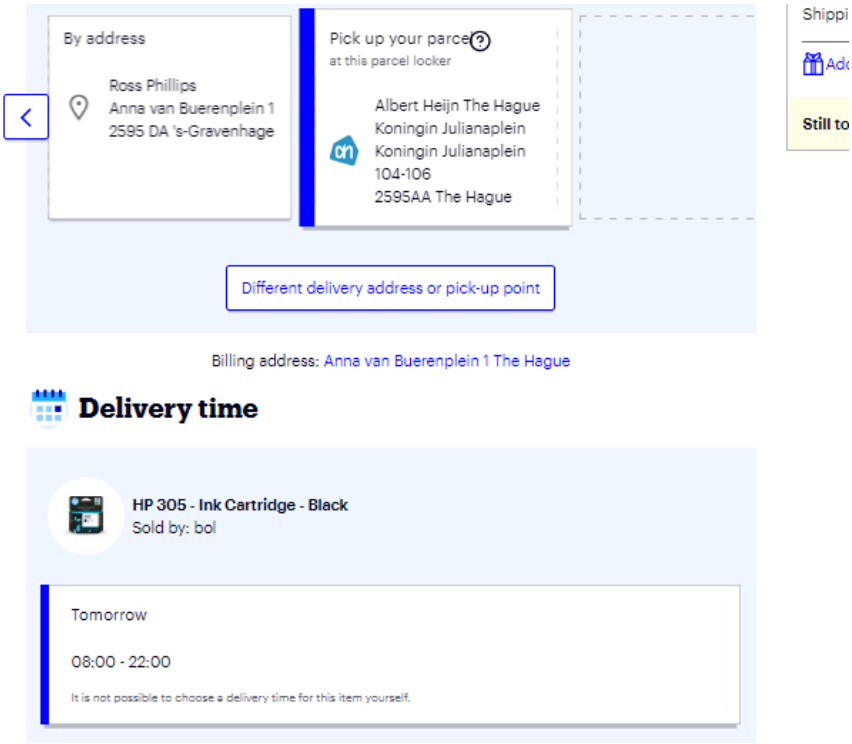
Click on “Different delivery address or pick up point”, get this popup:



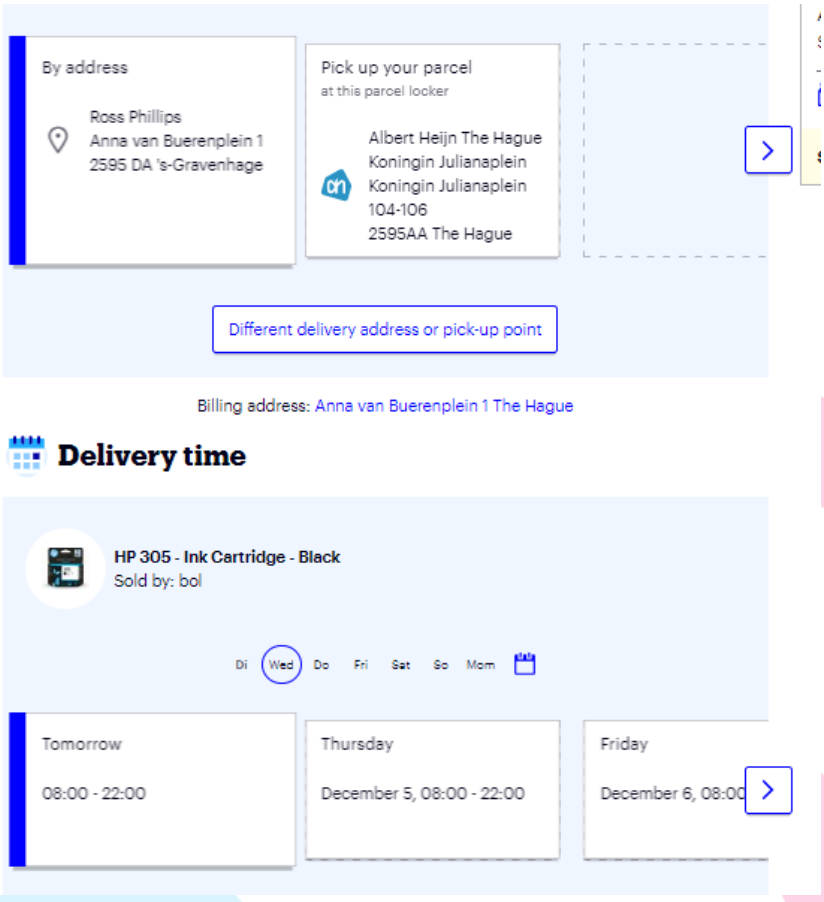
Click on «Pick-up points”, get 20 different Albert Heijn and Post places to choose from in a new scrollable popup; click on “?” in that popup gives you opening times but no map:



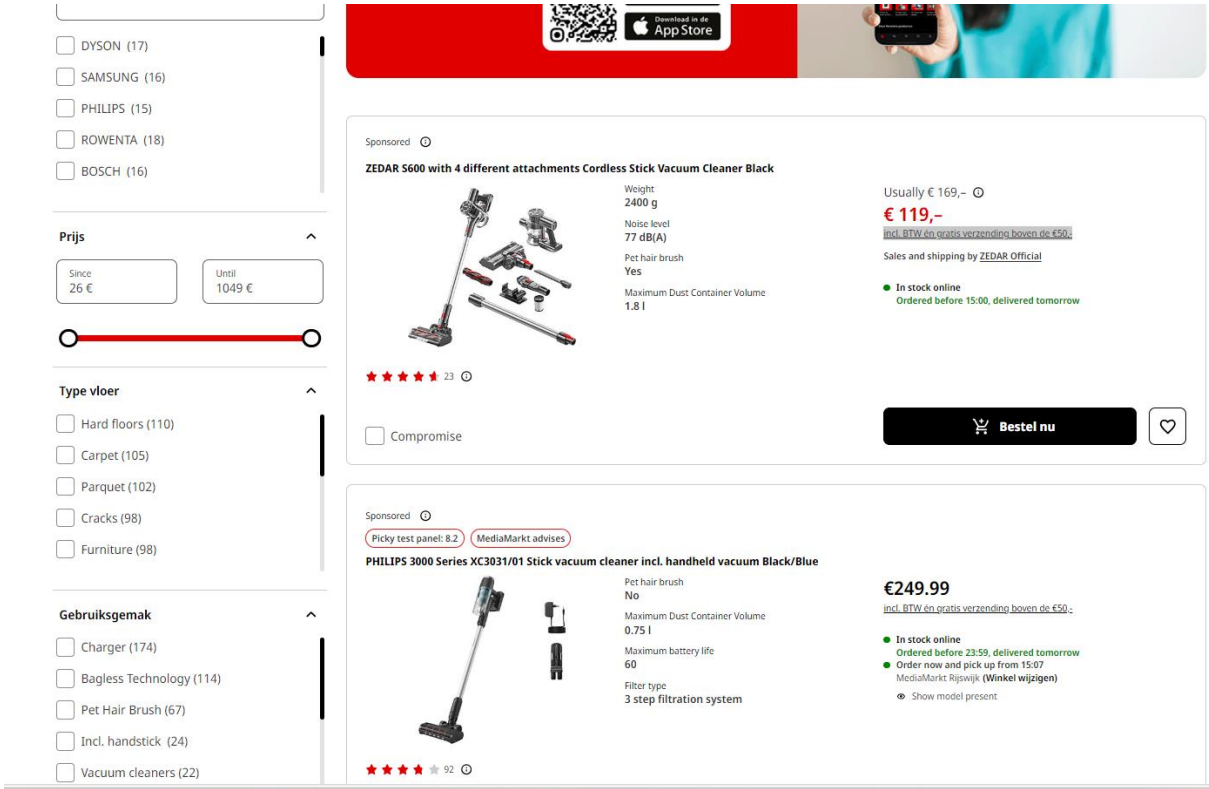
Note the only choice you get for pick-up is like this:



And for home delivery like this:

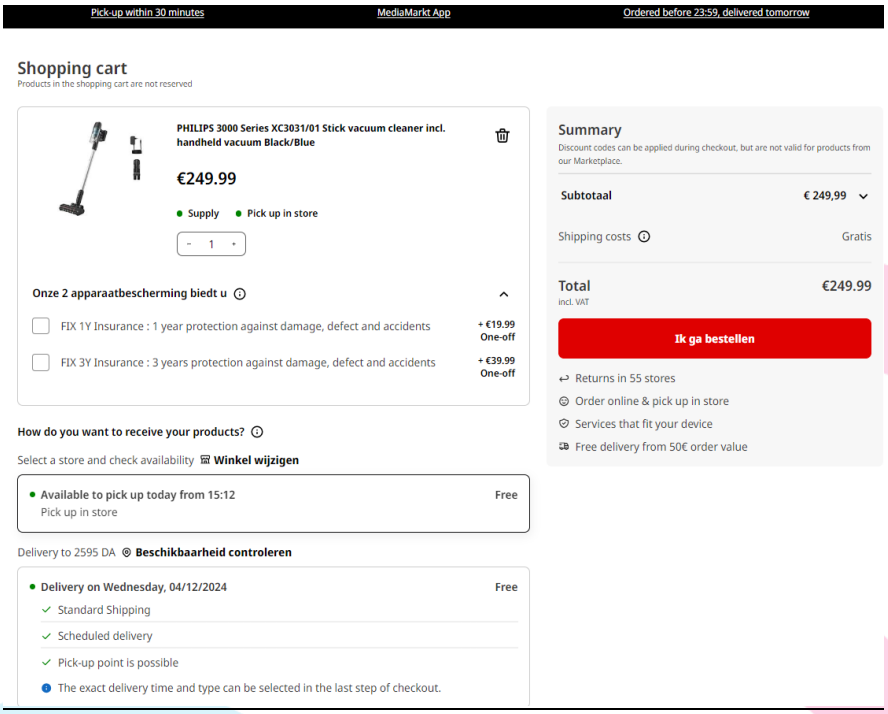


Mediamarkt.nl



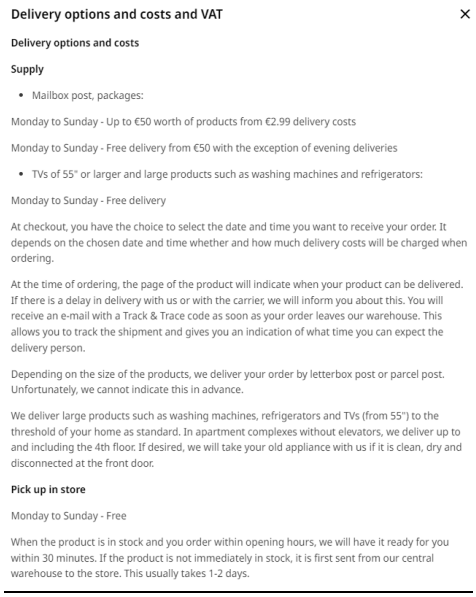
NB a lot of info on front page including “free delivery over 50 Euros”. Note pick up from15:07 is 30 minutes after time looked at!

Once in the basket, you get this:



Note 1) Order before midnight, delivery tomorrow, 2) The exact delivery time and type can be selected last – after paying!

<u>If you click on the small “i” by Shipping costs:</u>



Delivery options and costs and VAT

Delivery options and costs

Supply

- Mailbox post, packages:

Monday to Sunday - Up to €50 worth of products from €2.99 delivery costs

Monday to Sunday - Free delivery from €50 with the exception of evening deliveries

- TVs of 55" or larger and large products such as washing machines and refrigerators:

Monday to Sunday - Free delivery

At checkout, you have the choice to select the date and time you want to receive your order. It depends on the chosen date and time whether and how much delivery costs will be charged when ordering.

At the time of ordering, the page of the product will indicate when your product can be delivered. If there is a delay in delivery with us or with the carrier, we will inform you about this. You will receive an e-mail with a Track & Trace code as soon as your order leaves our warehouse. This allows you to track the shipment and gives you an indication of what time you can expect the delivery person.

Depending on the size of the products, we deliver your order by letterbox post or parcel post. Unfortunately, we cannot indicate this in advance.

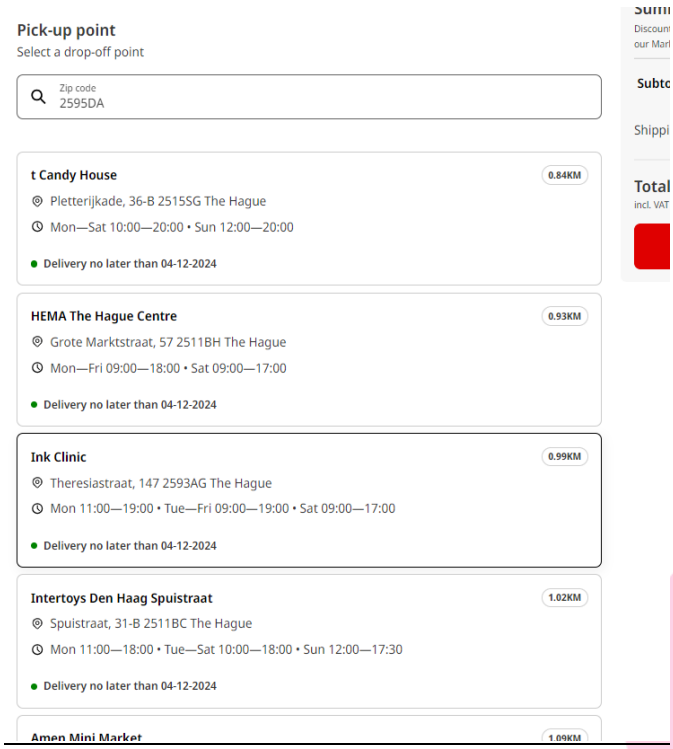
We deliver large products such as washing machines, refrigerators and TVs (from 55") to the threshold of your home as standard. In apartment complexes without elevators, we deliver up to and including the 4th floor. If desired, we will take your old appliance with us if it is clean, dry and disconnected at the front door.

Pick up in store

Monday to Sunday - Free

When the product is in stock and you order within opening hours, we will have it ready for you within 30 minutes. If the product is not immediately in stock, it is first sent from our central warehouse to the store. This usually takes 1-2 days.

If you go further, you get 3 steps 1) address 2) payment 3) overview. In step 1) already you choose delivery to home address or pick-up points:



Pick-up point

Select a drop-off point

Zip code 2595DA

t Candy House 0.84KM
Pletterijkade, 36-B 2515SG The Hague
Mon—Sat 10:00—20:00 • Sun 12:00—20:00
Delivery no later than 04-12-2024

HEMA The Hague Centre 0.93KM
Grote Marktstraat, 57 2511BH The Hague
Mon—Fri 09:00—18:00 • Sat 09:00—17:00
Delivery no later than 04-12-2024

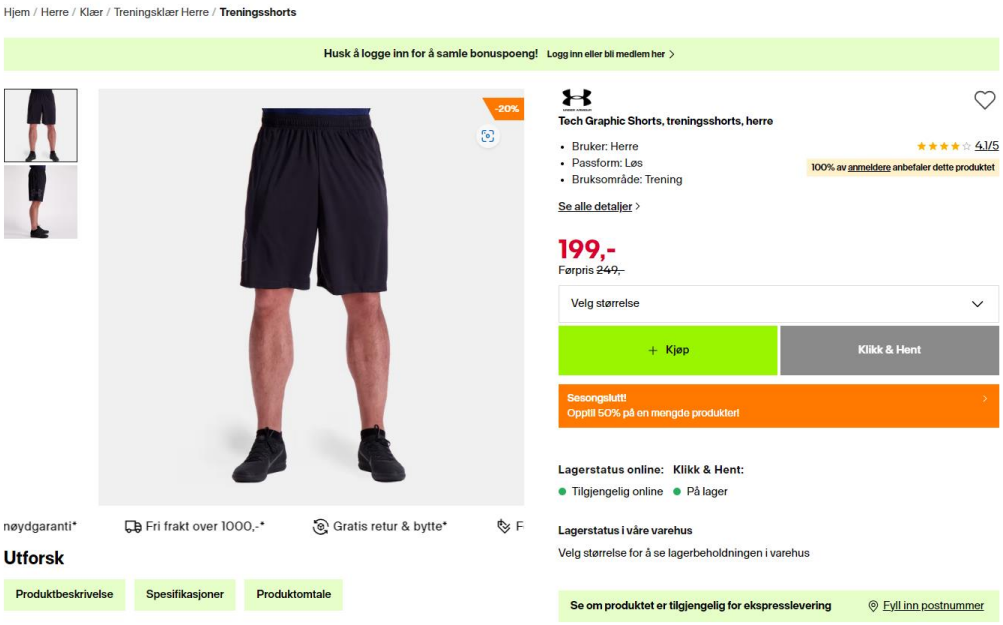
Ink Clinic 0.99KM
Theresiastraat, 147 2593AG The Hague
Mon 11:00—19:00 • Tue—Fri 09:00—19:00 • Sat 09:00—17:00
Delivery no later than 04-12-2024

Intertoys Den Haag Spuistraat 1.02KM
Spuistraat, 31-B 2511BC The Hague
Mon 11:00—18:00 • Tue—Sat 10:00—18:00 • Sun 12:00—17:30
Delivery no later than 04-12-2024

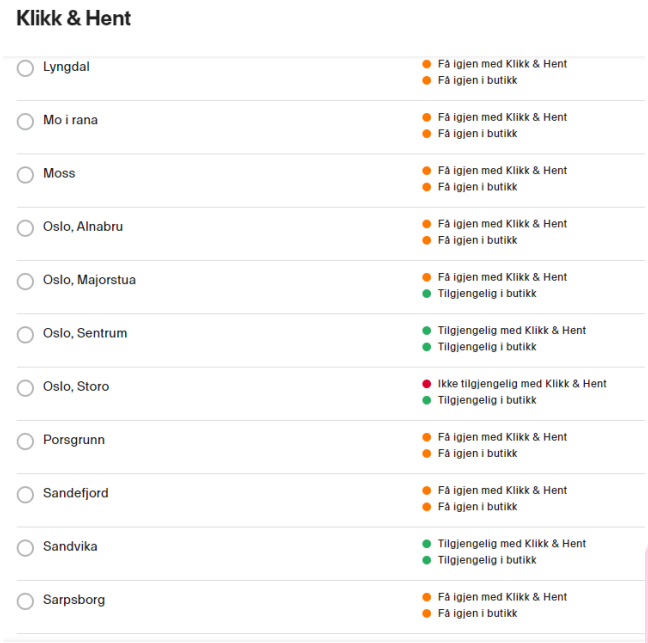
Amen Mini Market 1.09KM

No further info accessible for pick-up point e.g. map. In home delivery you don't get a time – still just "Wednesday".

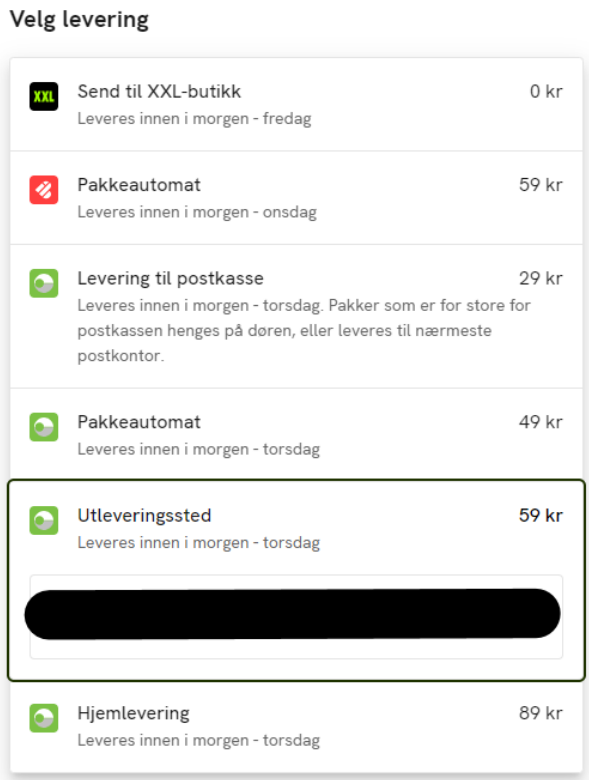
xxl.no



If you click on “Click+Collect” (Klikk & Hent):

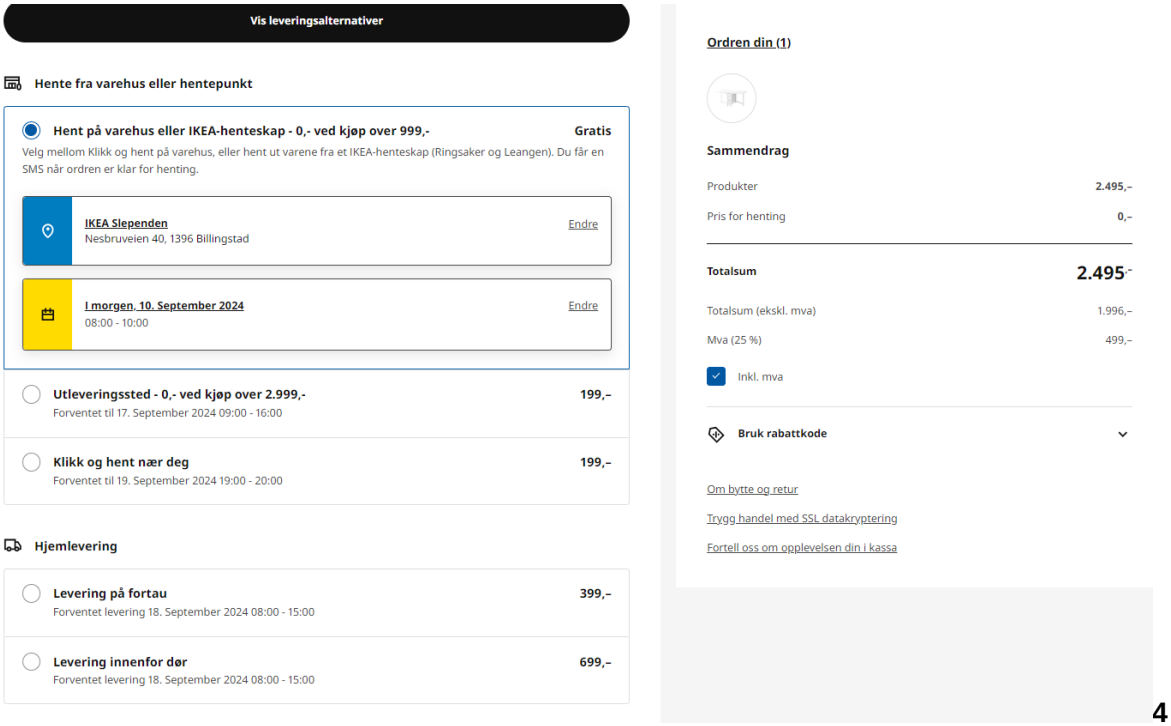


If you go click on “Buy” (Kjøp):



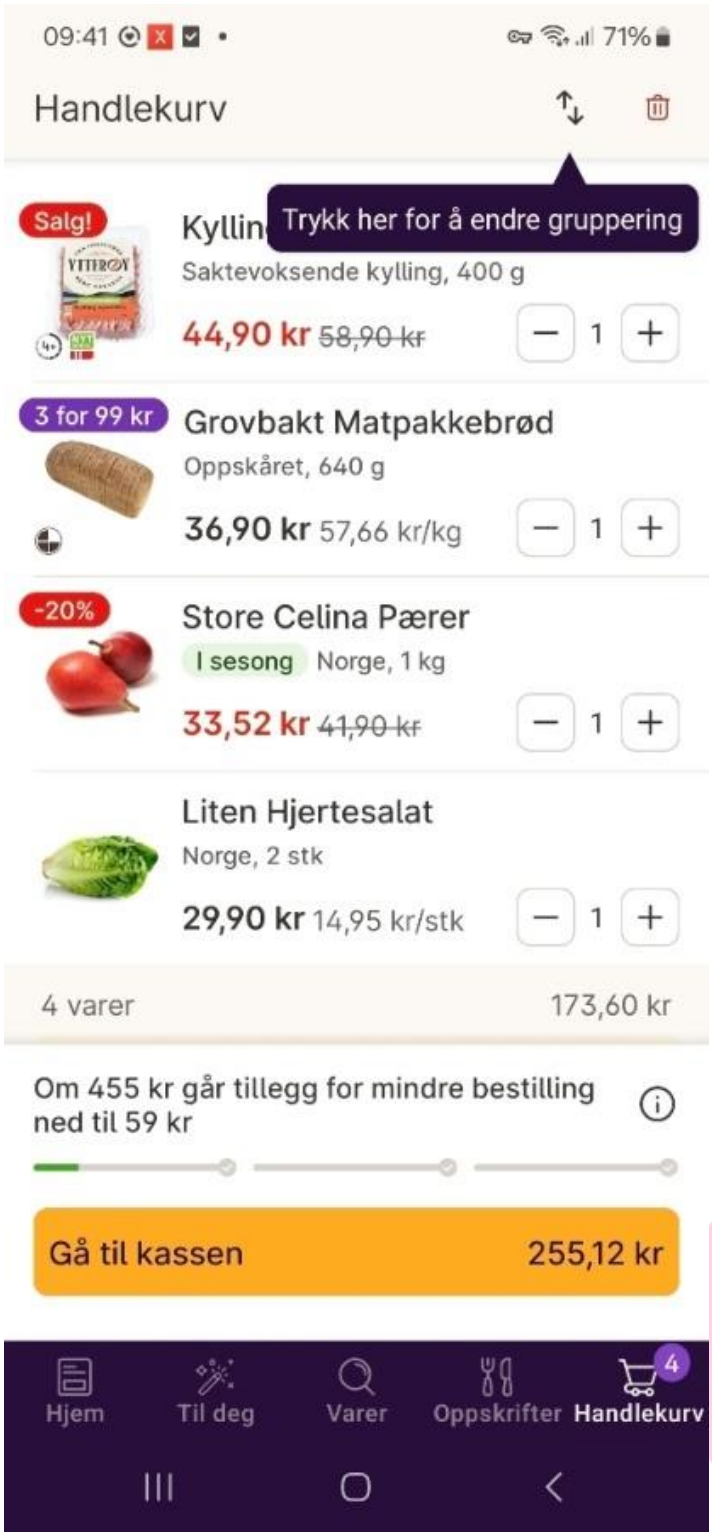
3

ikea.no


Vis leveringsalternativer
Hente fra varehus eller hentepunkt
Hent på varehus eller IKEA-henteskap - 0,- ved kjøp over 999,-
Gratis
Velg mellom Klikk og hent på varehus, eller hent ut varene fra et IKEA-henteskap (Ringsaker og Leangen). Du får en SMS når ordren er klar for henting.
IKEA Slependen
Nesbruveien 40, 1396 Billingstad
Endre
I morgen, 10. September 2024
08:00 - 10:00
Endre
Utleveringssted - 0,- ved kjøp over 2.999,-
199,–
Forventet til 17. September 2024 09:00 - 16:00
Klikk og hent nær deg
199,–
Forventet til 19. September 2024 19:00 - 20:00
Hjemlevering
Levering på fortau
399,–
Forventet levering 18. September 2024 08:00 - 15:00
Levering innenfor dør
699,–
Forventet levering 18. September 2024 08:00 - 15:00
Ordren din (1)
Sammendrag
Produkter
2.495,–
Pris for henting
0,–
Totalsum
2.495-
Totalsum (ekskl. mva)
1.996,–
Mva (25 %)
499,–
Inkl. mva
Bruk rabattkode
Om bytte og retur
Trygg handel med SSL datakryptering
Fortell oss om opplevelsen din i kassa

4

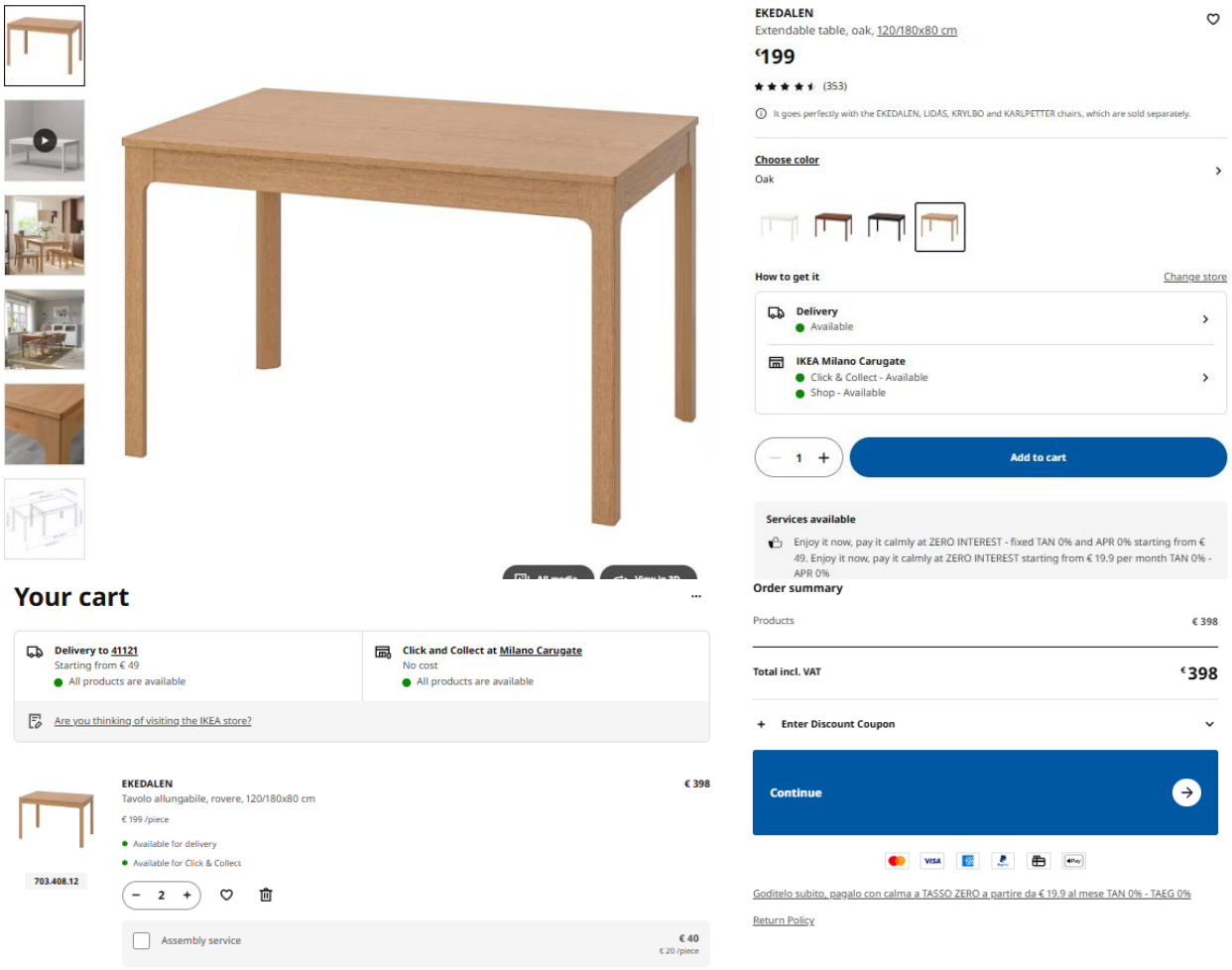
oda.no (groceries



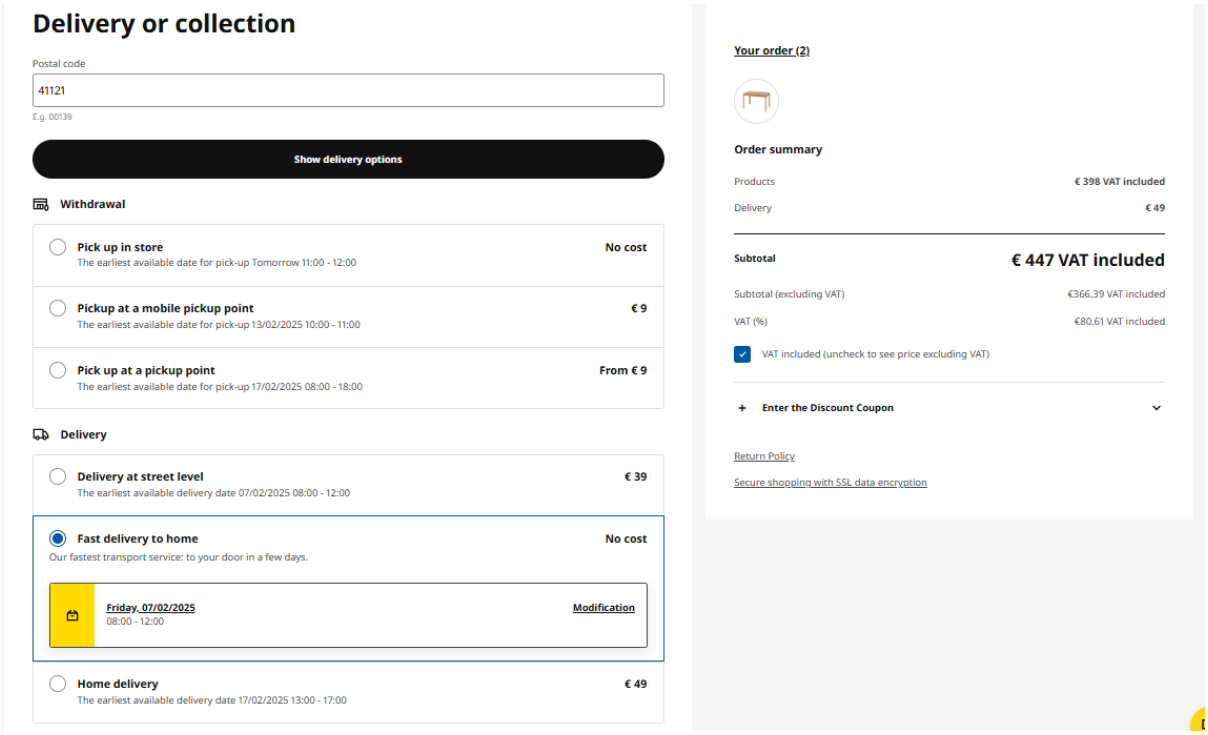
You go further and are presented with the following delivery options:

Ikea.it

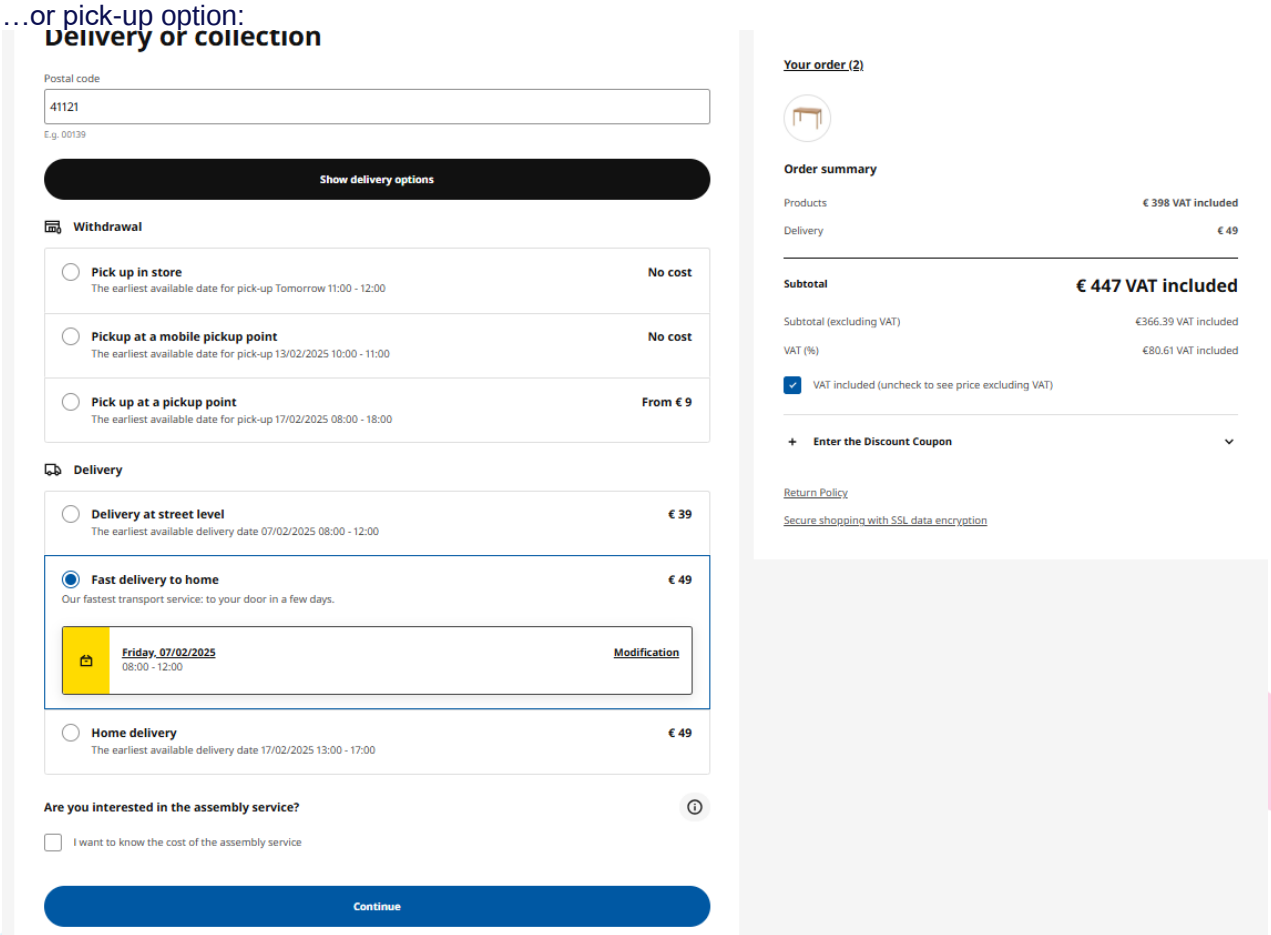
Note heavy item selected here, but cargo bike available for smaller items in Milan (not shown here).



Continuing, choosing a home delivery option:



…or pick-up option:



Annex E: Final coding template

- Contextual factors
    - Frequency of online shopping
    - How online shopping fits as part of a shopping strategy
    - Mental model – how things are delivered
    - Online shopping context (PC, mobile, place of use)
    - Online shopping goals, what matters
    - Usual delivery method and own transport
    - Platforms used and products bought
    - Real-time product choice – cognitive strategy, thoughts of delivery
    - Residential area
    - Return behaviour
- Online choice of delivery method
    - Situation typicality and delivery choice
    - Byproducts of recognition
        - Expectancies and pre-existing knowledge of delivery options
        - Suprises
        - Cues and triggering of pre-existing knowledge
        - Goals and trade-offs
    - Clarification of surprises
    - Diagnosis (feature matching, story building)
    - Evaluate action n (mental simulation)
    - Implement and experience the situation in a changing context
        - Negative delivery or return experiences
        - Positive delivery or return experiences
        - Strategies for collecting
        - Strategies for returning
    - Modifying actions that don’t work
- Online delivery – cognitive challenges and barriers
    - Barriers to choosing delivery or return option
        - Interface challenges
        - Mental model challenges
    - Enablers to deciding delivery
        - Interface challenges
        - Mental model challenges
- Sustainable delivery
    - Actual sustainable delivery choice
    - Barriers to deciding sustainable delivery
        - Interface challenges
        - Mental model challenges
    - Enablers to deciding sustainable delivery
        - Interface challenges
        - Mental model challenges
- Disconnect and guilt
- Meaning and mental model of sustainable delivery and return options

Annex F: Suprises

- Variation in cost of delivery from day to day, e.g. NL1 could not understand why she had to pay more for quicker delivery on a Friday than on a Saturday, which had less sociable hours for workers.
- Pick-up options that cost as much as or more than home delivery
- Parcel lockers that cost more than staffed collection points
- Not being able to choose delivery time and place at end of the online ordering process (e.g. NL2, Mediamarkt)
- Imprecise delivery times, e.g. “delivery in a few days”
- Incorrect opening times of pick-up points
- Being asked to choose which supermarket outlet will deliver their groceries (e.g. Jumbo, NL4)
- Parcel arrives at unexpected location (e.g. parcel locker instead of service point or vice versa) or re-routed to pick-up point because consumer was not at home
- Fee for package preparation on top of delivery fee
- “Free home delivery” advertised early on in ordering process turns out to apply only for selected time slots
- Delivery costs that are large relative to item cost (e.g. 9.50 Euros for 30 Euro order)
- Same-day delivery offered
- Free delivery on a Sunday
- Not being able to pick up at any physical store owned by the platform being ordered from
- Normal courier replaced by an alternative courier not acquainted with delivery preferences
- Inconvenient or illogical pick-up points offered (e.g. further away than physical store)

Annex G: Sustainability profiles

	Free delivery or return	Home delivery	Congestion, parking	Buying products from afar	Loss of social connectedness	Emissions (inc. Flights)	Return transport from homes, collection points	Express delivery, less-than-full trucks	Working conditions, drivers and warehouse staff	Efficient delivery of more parcels to more places	Traffic safety	Greenwashing (false sustainability claims by sellers)	Packaging materials and space used by packaging
BE1			■					■	■				
BE2							■	■					
BE3					■	■	■						
BE4							■						
BE5				■	■		■	■					
IT1							■	■	■				■
IT2		■	■			■	■						
IT3	■		■	■		■	■	■	■	■			
IT4						■	■	■	■	■			■
IT5								■					■
NL1		■											
NL2		■					■			■			
NL3					■	■	■	■		■		■	
NL4			■					■		■			
NL5			■				■			■			
NO1					■	■	■			■			
NO2	■			■			■		■				
NO3					■			■	■	■			
NO4			■			■	■			■	■		
NO5										■	■		
NO6													
NO7			■			■							

Annex H: Mental models of delivery

Constructed from relevant, anonymised participant comments after entering following request into ChatGPT: *From the following description, can you make a simple diagram to represent this person's mental model of how things get delivered? Please use at most 8 steps.*

BE1

Warehouse (or third-party store) prepares for shipment
|
Item packed and shipped to central warehouse
|
Smaller trucks pick up items
|
Delivery route is planned with delivery points
|
Items delivered by small trucks to customer's location

BE2

Regional warehouse prepares item for shipment
|
Item trucked to first terminal
|
Sorting at first terminal
|
Item transferred to second terminal, further sorting
|
Item continues to next terminal (if needed)
|
Final truck delivery to customer's location

BE3

For Amazon products: item stored in Amazon warehouse
|
For external products: vendor prepares for shipment
|
Item is shipped via express or standard delivery

BE4

Seller prepares package (seals & tags)
|
Seller ships to local hub e.g., FedEx, Amazon
|
Shipping hub transports via air/sea to country
|
Package passes through coast, cities
|
Final delivery location in city hub
|
Delivery rider picks up

BE5

Product transported via boat or truck to hub
|
Product arrives at hub, sorted
|
Quality control checks the product
|
Taxes and customs processing applied
|
Product sent to local warehouse, delivery preparation

IT1

Order sent to warehouse via computerized system
|
Warehouse prints label and prepares package
|
Courier is contacted and arranges pickup
|
Courier and company send status updates to the system
|
Package is tracked in the system by customer

IT2

Order sent to external warehouse (if no own warehouse)
|
External warehouse receives order and packs item
|
Item sent to local warehouse if needed
|
Item is shipped via a courier e.g., DHL
|
Shipping information dent to customer for tracking

IT3

Order sent to office for administrative checks
|
Order moved to logistics for package preparation
|
Package is prepared and ready for shipping
|
Package given to courier for delivery
|
Courier tracks and travels with package
|
Package arrives at city hub for sorting
|
Courier delivers the package to customer

IT4

Warehouse employee retrieves product and Prepares it
|
Product loaded onto van for transport
|
Van moves product to collection center (in region/city)
|
Product sorted at center
|
Van assigned to deliver product in specific area or road
|
Carrier delivers product to customer's location

IT5

Order is processed and shipped

NL2

Order shipped from warehouse in South Europe, Germany, or UK
|
Transported to the Netherlands (via e.g., DHL)
|
Checked in at a warehouse
|
Sorted at regional center for distribution
|
Sorted further by neighborhood or delivery area
|
Last-mile delivery by freelancer or part-time courier

NL3

Sales department receives order notification
|
Automated system identifies closest store or warehouse
|
Employee or robot retrieves product and packages
|
Packaging checked and prepared for shipping
|
Order sent to courier (e.g., Post Office, DHL)
|
Courier collects and transports order to distribution hub
|
Package delivered to customer through various delivery channels

NL4

Order processed to identify closest warehouse
|
Product (e.g., jacket) picked from warehouse
|
Item packed in box and labeled with delivery information
|
Logistics provider (e.g., DHL) receives package
|
Package sorted at hub
|
Package transported to customer or pickup point

NL5

Webshop Prepares Product (Warehouse or Shop)
|
Product Packed and Label Applied for Delivery
|
Carrier Collects Package from Webshop or Warehouse
|
Carrier Sorts Packages at Central Sorting Facility
|
Packages Consolidated with Other Goods for Same Destination
|
Package Transferred to Smaller Vans for Local Delivery

NO1

Order received in warehouse, staff locate, retrieve item
|
Staff prepare item for shipping
|
Send to post service
|
Post service receives item, begins final delivery process

NO2

Customer places order with company
|
Company prepares product
|
Carrier (e.g., PostNord or Posten) picks up package
|
Package transported by truck (possibly with other products)
|
Package sorted at distribution hub (in Norway or nearby region)
|
Package sent to local center or sorting facility
|
Courier delivers package to customer

NO3

Customer places order on website
|
Warehouse employee packs product next day
|
Tracking number sent to customer via email
|
Product piled for pickup by Posten or PostNord
|
Transporter transports to central warehouse
|
Automated sorting
|
Package loaded into delivery vehicle
|
Driver delivers package to customer

NO4

Warehouse checks stock: if not available, ordered from another location
|
Product picked from warehouse
|
Product packaged and label with customer information
|
Package collected by carrier (Posten/PostNord, Bring, Helt Hjem)
|
Package transported to sorting facility (local hub within Oslo area)
|
Robots or manual sorting at sorting center
|
Package delivered by van to customer's address or pickup point

NO5

Logistics system receives message
|
System updates warehouse with order details
|
Employee retrieves product from warehouse (manual or automated)
|
Product and delivery information prepared for shipping
|
Delivery details entered into system or printed on label
|
Package sent to Posten/PostNord for delivery
|
Posten/PostNord receives package and sorts it
|
Package delivered to home or pickup point