D2.3 End-user preferences and trade-offs (stated preferences)

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Deliverable information sheet

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Executive summary

Project summary

Shift2Zero, Shifting to zero-emission logistics through right-sized, mission-focused, N1 e-LCVs

Current market dynamics in EU reveal a gap between supply - existing N1 vehicles, and demand - evolving needs of urban logistics and climate targets. In 2023, 1.2M new LCV registrations were diesel-powered, and only 108,200 battery electric. Last-mile logistics, the least efficient and most complex part of the supply chain, presents significant opportunities for improvements at vehicle and operations levels. Dynamic requirements and increasing environmental impacts require innovative solutions from the automotive industry, both from high volume OEMs and new entrants. S2Z aims to capitalize on the benefits of both vehicle platforms in the N1 segment - represented by IVECO's eDaily multipurpose platform, and Alke's ATX design-for-purpose platform - ultimately contributing to "Shifting to zero-emission logistics through right-sized, mission-focused, N1 e-LCVs".

To achieve this vision, S2Z proposes a 4-step user- and mission-centric design approach placing end-users and their needs at the core of all project activities. To this end, S2Z involves 5 logistics service providers (LSPs) & mobility operators as partners: Gruber, DHL, Diakinisis, Clem, DPD. As a result, S2Z will co-develop and shape at least 6 novel N1 concepts with enhanced and safe functionalities leading to tighter market fit, particularly in the segments of e-commerce, returns and cold deliveries.

Innovative concepts, from modular cargo bodies to vehicle control strategies with optimized tyres & brakes, as well as dual transport of people & freight, will be physically prototyped and tested in real-life operations in 6 pilot sites (Belgium, Greece, Italy, 2 in Norway, Poland).
S2Z brings a multidisciplinary consortium of 30 partners from 10 countries to cover the complete automotive and logistics value chains, complemented by policymakers to effectively ensure route to market: overcoming barriers for the adoption of S2Z e-LCVs, reducing operational costs and environmental impact in scalable urban & sub-urban operations.

Deliverable summary

Goal and objectives

Deliverable 2.3 "End-user preferences and trade-offs (stated preferences)", is part of work package 2 (WP2) in the Shift2Zero project, which identifies user requirements to support the technical development (WP3) and pilot demonstrations (WP6) of the vehicle innovations.

The deliverable builds on earlier work in task 2.1 (T2.1) - stakeholder mapping and user context analysis; and T2.2 - identification of vehicle-level design needs. Insights from these tasks informed the survey design by helping to select relevant user groups, define the key attributes and levels of electric light commercial vehicles (e-LCVs), and capture the operational contexts in which the vehicles will be used.

The goal of D2.3 is to quantify how operational users of e-LCVs evaluate and prioritise key e-LCV features. The study addresses three objectives and related research questions:
*- **Objective 1:** Identify and quantify user preferences and trade-offs for basic and innovative e-LCV features for the full sample as well as for different sub-groups, depending on user role, experience level, vehicle type, delivery type, delivery area, countries.*
*- **Objective 2:** Identify latent user segments based on similar preference structures in e-LCV choices.*
*- **Objective 3:** Integrate utility values into market simulations to identify the share of preference for alternative e-LCV innovation levels.*

Methodology
*The research used a Choice-Based Conjoint (CBC) experiment to quantify how users make trade-offs between e-LCV features. This method simulates real-world decision-making by asking respondents to choose between alternative vehicle configurations in choice tasks. These alternative vehicle configurations were composed of different levels of **six different attributes**, namely:*

1. *Purchase price*
2. *Payload and cargo volume*
3. *Battery range*
4. *Multi-temperature zone*
5. *Energy management system*
6. *Swap box*

The CBC was implemented through a structured online survey that comprised background questions, eight choice tasks, and follow-up questions. The survey collected 512 complete responses from logistics professionals, including employed drivers (44.7%), self-employed drivers (25.8%), fleet managers (8.6%), branch and depot managers (12.7%), and other roles (8.2%). Respondents were based in nine countries, including Poland (56.3%), Belgium (20.7%), Norway (9.6%), Greece (8.4%) and Italy (2.7%) as Shift2Zero pilot countries. Smaller shares came from Germany (2.7%), the Netherlands (2.1%), France (2.0%), Spain (1.2%), and other countries (1.2%). The sample covered various logistics segments such as postal and parcel delivery (83.4%), e-commerce and retail (24.6%), pharmaceutical and medical goods (18.9%), food deliveries for mixed goods without strict temperature control (18.4%), cold-chain deliveries for cooled or frozen goods (13.7%), and other types of delivery (5.7%).

*For the analysis, the sample was restricted to **457 respondents** that included users of diesel (55.9%) and electric vans (33.4%), excluding users of other vehicle types, such as cargo bikes or trucks (10.8%). The data analysis combined:*
*- **Hierarchical Bayes (HB) estimation** to compute individual-level part-worth utilities and attribute importances, as well as subgroup comparisons (Objective 1),*
*- **Latent Class Analysis (LCA)** to identify distinct preference segments (Objective 2), and*
*- **Market simulations** to evaluate the share of preference for the innovations (Objective 3).*

Key results
User preferences and trade-offs (objective 1)
The attribute importance scores in Figure ES-1 show that users generally prioritise battery range as the most important vehicle attribute (26.9%), followed by payload or cargo volume (22.4%) and purchase price (18.0%). Among innovative features, they rank multi-temperature zone first (13.5%), and similarly value energy-management system and swap box (both 9.6%).

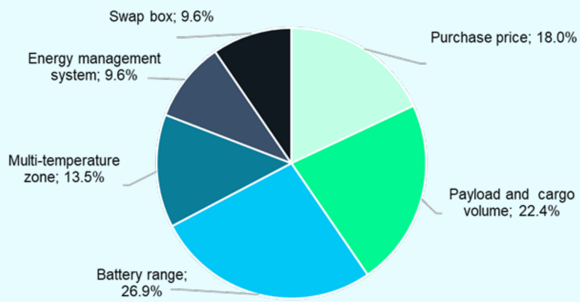

Figure ES-1. Attribute importance scores for the full sample (N = 457)

The findings show that innovations particularly add value when targeted to mission-specific applications and aligned with technical and economic conditions. The multi-temperature zones are relevant primarily for cold-chain, grocery, and medical deliveries, especially in combination with higher battery range and mid-level prices. The energy-management system is particularly valued by electric-van users, operators in more mature e-LCV markets (e.g. Norway), and fleets using medium-sized city e-LCVs. Swap boxes offer particular benefit in short- and medium-range urban operations with frequent number of stops and transshipment activities.*

Overall, the perceived value across all three innovations is highest when the total purchase price of the e-LCV, including innovations, remains below approximately €45,000 excl. VAT. Preferences vary by user role, vehicle type, delivery context, and country. Drivers prioritise battery range, while fleet and depot managers emphasise payload, volume, and cost efficiency. Diesel users are generally more price-sensitive, whereas electric-van users show stronger interest in the innovations. Delivery requirements and national conditions, such as operational context, infrastructure, and incentive structures, further define these preferences.

Latent user segments (objective 2)
The analysis identifies four distinct preference segments shown in Figure ES-2:

*1. **Cargo-capacity-oriented users (28.4%)** that prioritise payload and cargo volume*
*2. **Innovation-oriented users (28.9%)** that particularly value innovative features such as the multi-temperature zone, energy management system, and swap box*
*3. **Price-oriented users (19.2%)** that focus mainly on low purchase cost*
*4. **Range-oriented users (23.5%)** that emphasise large battery range*

The profiling analysis shows that the latent classes reflect context-specific preferences. Cargo-capacity-oriented users mainly operate in dense urban and mixed-parcel deliveries and need vehicles with large payload and cargo space, while range-oriented users more often work in rural or long-distance areas and need reliable battery range. Innovation-oriented users tend to work in specialised or temperature-sensitive deliveries and value advanced features, whereas price-oriented users focus on affordable purchase prices of the e-LCV.

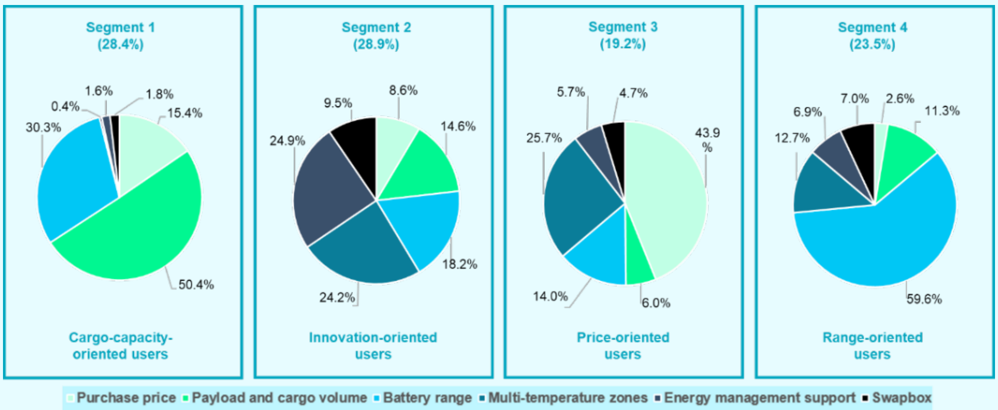

Figure ES-2. Average attribute importance (%) of each latent user segment (N = 457)

Market simulation (objective 3)
Preference-based market simulations were used to compare a current baseline e-LCV with advanced e-LCV configurations differing by one innovation level. The innovations that can be integrated without major changes to the logistics systems, such as energy-management systems, achieve higher perceived preference. In contrast, innovations that may require changes in logistics processes or system-level organisation, such as multi-temperature zones and swap boxes, achieve lower preference shares when analysed within e-LCV configurations. This suggests that the preferences may depend on users' familiarity, system and fleet integration requirements, and communication during testing and deployment.

Grant Agreement compliance
This deliverable is an independent report and not an update of any previous version. It complies with the Grant Agreement, the methodology, scope, and timeline were implemented as planned, with no major deviations.

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Terminology and Acronyms

CBC	*Choice-based conjoint (analysis)*
EC	*European Commission*
(e-)LCV	*(electric) light commercial vehicle*
EU	*European Union*
HB	*Hierarchical Bayes (method)*
L	*Level*
LCA	*Latent class analysis*
LC-MNL	*Latent class multinominal logit*
LEZ	*Low emission zone*
LSP	*Logistics service provider*
OEM	*Original equipment manufacturer*
RQ	*Research question*
S2Z	*Shift2Zero*
T	*Task*
WP	*Work package*
ZEZ	*Zero emission zone*

1. Introduction

This deliverable, D2.3 "End-user preferences and trade-offs (stated preferences)", presents the results of a **quantitative study on the user preferences for e-LCV features** conducted within the Shift2Zero project. The goal was to identify how logistics users evaluate and prioritise key electric light commercial vehicle (e-LCV) features, and to quantify the trade-offs they are willing to make between these features.

D2.3 is part of work package 2 (WP2), which focuses on defining user and mission-centric requirements for six innovations developed in Shift2Zero. It builds on insights from previous WP2 deliverables (see chapter 2.2.2):

- D2.1 - Ecosystem mapping, end-user requirements (fleet, system)
- D2.2 - End-user requirements (vehicle)

Based on these qualitative insights, D2.3 applies a Choice-Based Conjoint (CBC) methodology to quantify end-user preferences. The results provide evidence on which e-LCV features and innovations users value most, as well as under which operational and economic conditions.

1.1 Objectives of the deliverable

The overall aim is to understand how logistics users across Europe value key e-LCV features and innovations, and how these preferences differ across user groups, operational contexts, and countries. The study is structured around three research objectives and their associated research questions:

Objective 1: Identify and quantify user preferences and trade-offs for basic and innovative e-LCV features relevant to logistics operations

- **RQ1a:** How do logistics users in Europe express preferences and make trade-offs between basic and innovative e-LCV features?
- **RQ1b:** How do preferences and trade-offs differ **across user roles** (e.g. employed drivers, self-employed drivers, fleet managers, branch / depot managers)?
- **RQ1c:** How do preferences and trade-offs differ **across experience level** (e.g. low, medium, high experience)?
- **RQ1d:** How do preferences and trade-offs differ **across vehicle type** (i.e. electric vs. diesel van)?
- **RQ1e:** How do preferences and trade-offs vary **by delivery type** (e.g., parcel delivery, food delivery, cold chain product delivery, medical product delivery, e-commerce / retail delivery)?
- **RQ1f:** How do preferences and trade-offs vary **by delivery area** (e.g. city centre, urban periphery, residential area, industrial area, rural area)?
- **RQ1g:** How do preferences and trade-offs differ **between countries** in Europe (Belgium, Greece, Norway, Italy, Poland, Netherlands, France, Germany, Spain)?

Objective 2: Identify latent user segments based on similar preference structures in e-LCV choices

- **RQ2:** Which **distinct user segments** emerge in the sample based on similar patterns of preferences and trade-offs?

Objective 3: Integrate utility values into market simulations to identify preference shares for alternative e-LCV innovation levels

- **RQ3:** What is the **simulated share of preference** for different e-LCV innovations?

The findings will support the definition of user and system requirements (T2.5), the technical design of Shift2Zero prototype vehicles (WP3), and the planning and implementation of the pilot demonstrations (WP6).

1.2 Structure of the deliverable

This deliverable is organised into four main chapters:

- **Chapter 1** introduces the purpose, objectives, and scope of the deliverable and explains its position within the Shift2Zero project.
- **Chapter 2** describes the methodological approach, including the design of the stated-preference survey, the selection and definition of attributes and levels, survey implementation, and the analytical procedures used for the conjoint analysis, latent class analysis, and market simulations.
- **Chapter 3** presents the results, including the sample description, followed by the findings from the choice-based conjoint analysis (objective 1), the latent class analysis (objective 2), and the market simulation (objective 3).
- **Chapter 4** summarises the key conclusions and discussions for each objective.

The deliverable also includes an executive summary, lists of tables and figures, terminology and acronyms, list of references, and annexes.

2. Methodology

2.1 Overview methodology

The study applies a **Choice-Based Conjoint analysis** to quantify how logistics users evaluate and prioritise e-LCV features. CBC was selected because it simulates practical decision-making by asking respondents to choose between competing vehicle configurations rather than rating isolated features. It is one of the most widely used stated-preference method for estimating individual-level utilities, due to its ability to model actual choice behaviour (Halme & Kallio, 2011).

As a discrete choice experiment, CBC is well established in transport and consumer behaviour research for estimating the value users assign to product attributes (Lebeau, et al., 2016; Shang & Chandra, 2023; Eggers et al., 2022; Steiner & Meißner, 2018). It enables the analysis of operational trade-offs across multiple dimensions, such as cost, functionality, and sustainability, making it well suited for assessing e-LCV adoption in urban logistics operations (Nguyen et al., 2019; Caspersen & Navrud, 2021).

The methodological process consists of the following components that overall correspond to the three research objectives of the deliverable:

- **Research design and data collection**: A multilingual online survey with eight CBC choice tasks, complemented by background and follow-up questions, was designed and implemented among logistics users across Europe.
- **Hierarchical Bayes (HB) estimation** *(Objective 1)*: HB estimations were used to compute individual-level part-worth utilities and attribute importance scores, and to analyse preference differences across user roles, experience levels, vehicle types, delivery types, delivery areas, and countries.
- **Latent Class Analysis (LCA)** *(Objective 2)*: A latent class analysis was applied to identify distinct behavioural user segments based on similar preference structures.
- **Market simulations** *(Objective 3)*: Market simulations were conducted to assess the share of preference for the different innovation levels within vehicle configurations, compared to a baseline vehicle configuration.

2.2 Survey design

2.2.1 Survey structure

The survey was designed to explore logistics users' preferences for e-LCVs in urban delivery contexts. It aimed to identify which vehicle features matter most in practice and how different configurations are evaluated in operational decision-making.

The final questionnaire consisted of three main sections, framed by an introduction and a closing screen (see chapter 6.1 (Annex 1)). The structure was as follows:

- **Introduction**: Included a brief overview of the Shift2Zero project, objectives of the survey, estimated duration (~15 minutes), GDPR compliance, and a link to the informed consent form (see chapter 6.2 (Annex 2)).
- **Section 1: Work and Experience**: Gathered background information on participants' roles in logistics, type of company, vehicle types used, experience in

the logistics field, experience with electric vans, ownership models, delivery areas, and relevant regulations.

- **Section 2: Introduction Vehicle Attributes & Choice Tasks:**
    - **Introduction Vehicle Attributes:** Started with the introduction of six key vehicle attributes, each described through explanations and supported by illustrative images of four levels per attribute (see chapter 2.2.2). To enhance comprehension, each attribute introduction was followed by a brief question on the respondent's experience and perceived importance of the feature (see chapter 6.1 (Annex 1), for examples).
    - **Choice Tasks:** Comprised eight different choice tasks. Each task displayed three electric van configurations, with attribute levels systematically varied across tasks while appearing random to respondents. Respondents had to select their preferred option in each task, based on their professional needs and use cases.
- **Part 3: Final Questions**: Collected additional insights on the challenges faced with delivery vehicles, feature priorities, and familiarity with the vehicle features to provide additional contents for interpretation of the choice task results.
    - **Closing Section**: Thanked respondents and provided links for further engagement (e.g. Shift2Zero newsletter, project website).

The survey content was **translated into seven languages** to enhance accessibility across the project's European scope: English, German, Dutch, French, Italian, Greek, and Polish. All translations were reviewed by local project partners on accuracy.

2.2.2 Attribute and level selection

The **definition of attributes and levels is a key step** in designing a CBC experiment, as it directly shapes the choice of respondents and the validity of preference estimates. Attributes must be clearly defined, mutually exclusive, and relevant to the decision context (Steiner & Meißner, 2018). The number of attributes was limited to six to balance realism and cognitive effort (Orme, 2010; Hair et al., 2010).

Each attribute was defined using four levels, which falls within the commonly recommended range of two to five levels per attribute (Orme, 2010; Steiner & Meißner, 2018). The levels were designed to be realistic, easy to interpret, and covered a realistic range without introducing artificial extremes (Eggers & Sattler, 2011). Levels were formulated in concise, comparable formats and, where appropriate, supported by visuals to facilitate better comprehension (Orme, 2010). To avoid the number-of-levels effect, whereby attributes with more levels may receive disproportionate attention, all attributes were specified with the same number of levels (Steiner & Meißner, 2018).

The attribute selection process was based on three main inputs: **(1) methodological best practices**, **(2) insights from Shift2Zero T2.1 and T2.2**, and **(3) expert consultation** with original equipment manufacturers (OEMs), technology developers, and logistics partners. This was complemented through the participation and stakeholder input gained in a workshop hosted by the International Transport Forum (ITF) on light commercial vehicles in April 2025. An list of features was derived from the six innovations to be developed in Shift2Zero (see Figure 1) and operational needs identified in T2.1 and T2.2. The S2Z innovations include the (1) cargo body with multiple temperature zones (here "multi-temperature zone"), (2) thermal comfort and safe ergonomics, (3) holistic energy management and control strategies (here "energy management system"), (4) swap box, (5) geofencing strategies, and (6) dynamic optimized space.

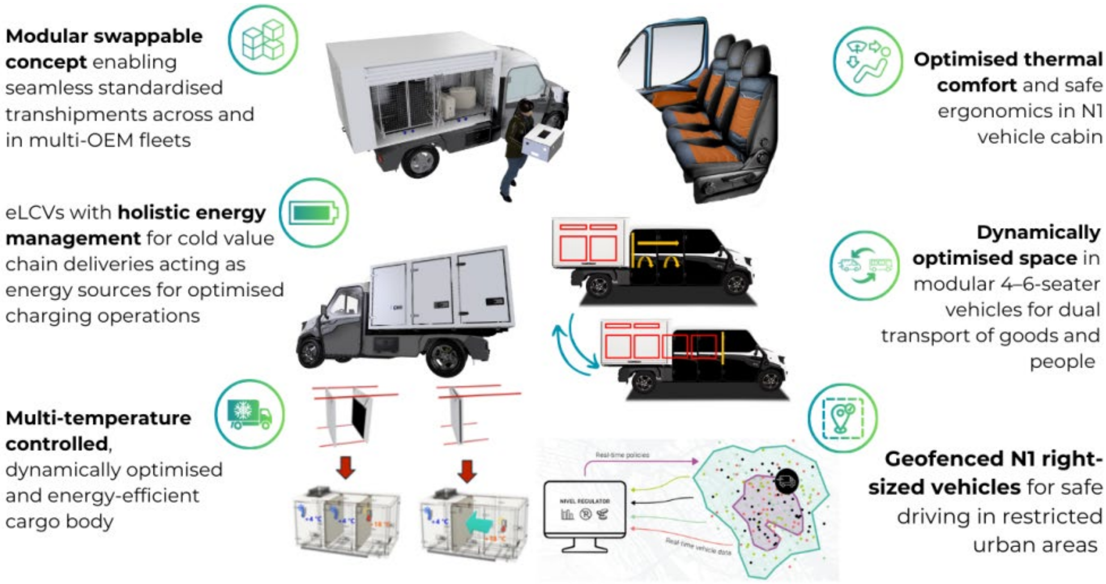

Figure 1. Innovations to be developed in the Shift2Zero project

The attributes were shortlisted on **user relevance**, **clarity**, **frequency of mention** in previous tasks, and **suitability for the CBC**, as the ability to express attributes and levels clearly. In agreement with the consortium, highly technical, complex, and single pilot-specific innovations were not selected, including thermal comfort and safe ergonomics, geofencing strategies, and dynamic optimised space. Each attribute selected based on operational relevance, user familiarity, and ability to support operational trade-offs:

- **Purchase price** reflects the purchase price of different e-LCV configurations, with basic models associated with lower prices and more advanced configurations (e.g., larger batteries, cooling systems, energy-management systems, and swap boxes) associated with higher prices. To ensure country comparability, values were defined excluding VAT and expressed in euros (€). Baseline levels were derived from OEM reference values provided for the Shift2Zero vehicles. Price was included as core economic attribute in e-LCV adoption decisions (Massiani, 2014).
- **Payload and cargo volume** represents maximum cargo capacity in kg and m³. Capacity varies by van size and equipment, for example, larger batteries or cooling systems may reduce the payload. It was selected as key operational vehicle feature and due to its importance mentioned in previous tasks (T2.1).
- **Battery range** indicates the maximum driving distance (in km) under typical delivery conditions. This may be influenced by factors such as battery size, vehicle weight, and energy use under realistic assumptions. Battery range was included as central determinant of electric vehicle adoption.
- **Multi-temperature zones** present a temperature-controlled cargo body with up to 3 zones (frozen, chilled, ambient), using adjustable, foldable partitions. Eutectic materials maintain temperature without drawing power from the vehicle. It was selected due to the relevance for cold chain and mixed goods delivery.
- **Energy management system** consolidates multiple innovations, including smart tyres, regenerative braking, and control strategies, that was expressed through gain in battery range (%). In this study, it is primarily evaluated as an energy-saving feature, but it also has potential benefits beyond range, including reduced tyre and brake wear, lower particle emissions, and improved overall efficiency.

- **Swap box** is a movable container placed in the cargo area to simplify loading, unloading, and transshipment. It includes wheels, a foldable frame, and tracking sensors for tracking temperature, movement, or humidity, depending on the level. It was chosen, since it was comparatively frequently mentioned in D2.1 and D2.2.

The **four levels for each attribute** were based on reference values provided by Shift2Zero OEMs and technology partners. Values for purchase price, payload, and battery range were based on vehicle data from Alke and Iveco; multi-temperature zone levels were informed by Coldcar; energy management specifications by IKA and Michelin; and swap box configurations by Paxster. Level 1 and level 4 represent lower and upper bounds of the values provided by the OEMs and technology partners, while level 2 and level 3 provide evenly spaced intermediate values. The final attributes and levels are presented in Table 1.

Table 1. List of attributes and levels used in the CBC

Attribute	Level 1	Level 2	Level 3	Level 4
Purchase price (excl. VAT)	€30,000 excl. VAT	€45,000 excl. VAT	€60,000 excl. VAT	€75,000 excl. VAT
Payload & cargo volume	< 300 kg / 3 m³	300–600 kg / 3-6 m³	600–900 kg / 6–8 m³	> 900 kg / 8-10 m³
Battery range	< 100 km	100–150 km	150–200 km	> 200 km
Multi-temperature zone	No cooling (standard cargo area without temperature control)	Single-zone cooling (1 single temperature zone, e.g. frozen OR chilled), all partitions are folded up	Double-zone cooling (2 separate temperature zones, e.g. frozen AND chilled), one partition is used and one is folded up	Multi-zone cooling (3 separate temperature zones, e.g. frozen, chilled, AND ambient), all partitions are used
Energy management system	Standard driving (no energy-saving features, +0% driving range)	Eco driving (basic eco driving mode that slightly reduces energy use, +5% driving range)	Advanced eco driving (regenerative braking and tyres to reduce energy use and type / brake wear, +10% driving range)	Smart driving (smart support adapting in real-time to minimise energy use and tyre / brake wear, +15% driving range)
Swap box	No swap box (goods are loaded directly in the cargo area)	Basic swap box (swap box without wheels, sensors, or special features)	Mobile swap box (swap box with wheels and data tracking sensor)	Smart foldable swap box (swap box with wheels, data tracking sensor, and foldable for return)

The final attribute set was designed to resemble a realistic full-vehicle configuration, combining cost, performance, and functionality aspects relevant to urban logistics. Therefore, it includes both basic features (purchase price, payload & cargo volume, battery range) and Shift2Zero innovations (multi-temperature zone, energy management system, swap box). While specified at **vehicle level**, several attributes also imply **fleet-level** (e.g. swap box, multi-temperature zone) or **system-level** (e.g. energy management system) considerations.

Multiple feedback loops were conducted to verify both the attribute set and its level definitions. These included technical validation with OEMs to ensure realistic performance values and practical validation with logistics service providers (LSPs) to confirm operational relevance. An internal pilot test was also conducted to assess the clarity of wording, visual presentation, and user comprehension before a soft launch and pilot tests were conducted later (see chapter 2.3).

2.2.3 Choice-based conjoint (CBC) experiments

The defined attributes and levels were integrated into a choice-based conjoint (CBC) experiment to explore how users make trade-offs between different electric vehicle features. The design of the CBC experiment was implemented using Sawtooth Software Lighthouse Studio v9.16.10, a specialized software for CBC analysis. Three key design decisions were taken to structure the experiment: the **number of choice tasks per respondent**, the **number of alternatives per task**, and the **design method** used to generate the tasks.

First, the **number of choice tasks** was limited to **eight per respondent** to balance data quality with participant engagement. Although some studies suggest that up to 15 tasks may still yield usable insights (Hoogerbrugge & van der Wagt, 2006), a shorter set was selected in this case due to the inclusion of additional survey sections. This decision aimed to reduce respondent fatigue and maintain attention throughout the survey.

Second, each choice task included **three alternatives** for the respondents to choose from. While more alternatives can technically enrich the trade-off space, they may also overburden respondents and reduce the efficiency of data collection, especially since only the selected option contributes to preference estimation. Following recommendations by Hair et al. (2010), three options were considered optimal to offer sufficient variation without overwhelming the user.

Finally, the choice tasks were generated using the **balanced overlap option** available in Sawtooth Software. While traditional CBC design aims to respect the principles of orthogonality (no correlation between attribute levels) and level balance (equal frequency of level appearances) (Hair et al., 2010), strict adherence to these can result in overly artificial or unrealistic profiles. The balanced overlap method intentionally relaxes these rules to an extent, allowing some repetition of attribute levels within choice tasks, while ensuring a good overall distribution of levels across the experiment.

To ensure respondents could easily understand and evaluate the choice tasks, each of the six attributes was introduced before the experiment with a short explanation and a visual showing all four levels (see example in Figure 2, all figures in chapter 6.1 (Annex 1). As some features, especially Shift2Zero innovations, may be unfamiliar, this step aimed to improve understanding and familiarity. A simple follow-up question after each attribute introduction, asking whether and what kind of level users had previously used of each attribute, helped improve understanding and gather initial impressions.

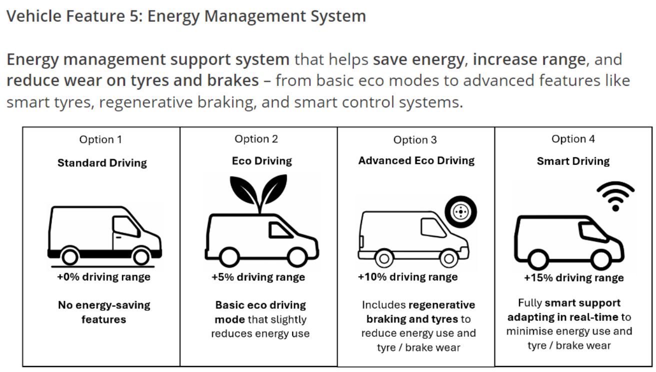

Figure 2. Example of the introduction of attribute and levels

Figure 3 shows an example of a choice task from the English survey version. A small icon next to each attribute provided access to its definition and the four levels previously introduced in the attribute explanation section.

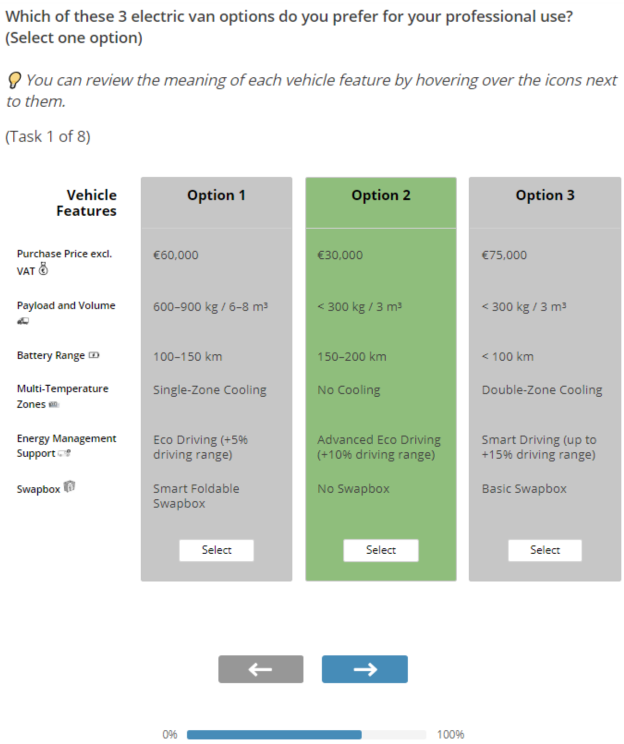

Figure 3. Example of a choice task in English

2.3 Survey implementation and data collection

Prior to the full launch, **pilot tests** were conducted to ensure the survey's accuracy, clarity, and practical relevance. First, internal reviews with project partners were carried out to verify the technical correctness and suitability of the content. This was followed by external testing during meetings with logistics companies, where early feedback was collected from potential participants. In addition, a **soft launch** was conducted during the

2025 Transport Logistics Fair in Munich, where approximately 30 logistics professionals from various European countries completed the survey. Feedback confirmed that the survey was clear and well-structured, and no revisions were required.

The primary target group consisted of logistics users, including **drivers, fleet managers, depot managers, and branch managers**. The main share of responses was provided by LSPs directly involved in Shift2Zero (DHL, DPD, Gruber, and Diakinisis). To achieve the target sample of 500 completed responses, outreach was extended to additional urban logistics operators beyond the project consortium. These included LSPs beyond the Shift2Zero consortium, national postal or parcel delivery services, e-commerce or retail companies, municipalities and public operators, and independent subcontractors. Companies were selected based on their involvement in urban logistics, ideally with experience operating or planning to operate e-LCVs or comparable fleet types and based in the **pilot countries of Shift2Zero** (**Belgium, Greece, Italy, Norway, and Poland**) or other European (partner) countries (France, Germany, Netherlands, Spain).

Data collection was conducted from 23th of June to 8th of August 2025, using different outreach strategies. Overall, participant recruitment relied primarily on in-person engagement and event attendance, followed by personalised email and phone contact, with additional outreach via media channels such as LinkedIn. Users from Shift2Zero LSPs were engaged through internal company applications, personalised email invitations, and on-site survey sessions coordinated with team leaders. Additionally, the survey was disseminated through the networks of project partners, including Eurecat, ALICE, and participating research institutions, as well as pilot city leads in Brussels, Bologna, Thessaloniki, Wroclaw, Bergen, and Oslo. These contacts shared the survey primarily through direct communication by email or phone. Broader visibility was achieved via LinkedIn posts, the Shift2Zero project newsletter, and key urban logistics networks such as the Green Deal Urban Logistics network in Brussels. Additionally, the survey was promoted during the Transport Logistic Fair in Munich through a dedicated Shift2Zero WP2 workshop, supported by flyers designed for this purpose.

The survey itself was hosted on the Sawtooth Software server and was accessible via a unique link or QR code. While responses were submitted online, participation was largely encouraged through in-person interactions and on-site meetings. Project partner LSPs engaged operational employees by providing explanations prior to the survey and facilitating participation during joint settings such as team meetings. In addition, in-person sessions and on-site visits at logistics operators (e.g. over ten on-site visits in Belgium) and vehicle inspection stations were conducted across different countries to directly engage users. These activities helped to improved clarity, response quality, and overall participation.

2.4 Data Analysis

2.4.1 Conjoint analysis and Hierarchical Bayes estimation (objective 1)

The initial step of the analysis was the estimation of part-worth utilities from the choice-based conjoint (CBC) experiment. The analytical framework follows Random Utility Theory, which assumes that respondents choose the option that provides the highest perceived utility (Friedel et al., 2022). Because utility is not directly observable, McFadden's (1974) discrete-choice model allows preferences to be inferred from observed choices. In this context, the estimated **part-worth utilities** represent how strongly each attribute level contributes to the likelihood of a vehicle configuration being selected (Orme, 2010). Higher utility values indicate more preferred attribute levels, while negative values simply show lower preference relative to other levels.

Utilities were estimated using **Hierarchical Bayes (HB)**, as common analysis approach for CBC because it produces individual-level utilities and captures preference heterogeneity across respondents (Wellman & Vidican, 2008). The HB procedure implemented in Sawtooth Software combines insights of the overall sample with respondent-specific likelihoods, generating utility estimates for each of the 457 respondents.

After estimation, utilities were normalised using **zero-centred differences**, making them comparable across attributes. **Attribute importance** scores were then computed based on the utility range within each attribute, specifically, the difference between the least and most preferred level, expressed as a share of the total utility variation across all attributes (Orme, 2010). These results enabled Objective 1, namely identifying and quantifying user preferences and trade-offs for basic and innovative e-LCV features, and directly answered RQ1a concerning preferences across the full sample.

To assess how preferences differ across subgroups, including user role (RQ1b), experience with electric vehicles (RQ1c), vehicle type (RQ1d), delivery type (RQ1e), delivery area (RQ1f), and country (RQ1g), the same HB utility estimation and importance computation procedures were applied to each subgroup. This corresponds to incorporating the sub-group variables, known through the survey answers, as **covariates within the HB estimations**. This approach is recommended when group membership is already known and theoretically relevant, since it provides more precise estimates that avoid shrinkage towards the population average (Orme & Howell, 2009).

To assess whether attribute preferences differed significantly across user groups, **non-parametric tests** were used because CBC utility distributions do not meet normality assumptions. For subgroup comparisons with more than two categories (e.g., user role, experience level, country), the Kruskal–Wallis test was applied, followed by post-hoc Mann–Whitney U tests with Holm correction (Zhang & Zhang, 2009). For variables with two categories (vehicle type, delivery type, delivery area), Mann–Whitney U tests with Holm-adjusted p-values were used. For questions allowing multiple selections, respondents were coded as “selected” or “not selected” and analysed using the same two-group approach. This procedure enabled answering RQ1b–RQ1g by identifying systematic differences in how user groups value vehicle attributes and levels.

2.4.2 Latent class analysis (objective 2)

A **Latent Class Analysis (LCA)** was conducted to address objective 2 to identify user segments with distinct preference structures for e-LCV features. LCA was applied because it can group users that show similar preference patterns into distinct user segments. In contrast, Hierarchical Bayes (HB) estimation assumes that preference heterogeneity is continuously distributed across respondents.

A **Latent Class Multinomial Logit (LC-MNL)** model was estimated to identify user groups that have distinct preference structures. To identify the appropriate number of groups, several statistical fit indicators were examined, including the Akaike Information

Criterion (AIC), Bayesian Information Criterion (BIC), adjusted BIC (ABIC), and the Consistent AIC (CAIC) (Weller et al., 2020). Based on the methodology, information criteria were evaluated together with likelihood improvements, replication stability, and segment size. This avoids very small segments (<10%) and focuses on inflection points rather than minimum values alone (Sawtooth, 2021). Both the three- and four-class models showed stable replications and acceptable group sizes. The **four-class solution** was selected, since it splits a broad price-sensitive group into two distinct segments, including an innovation-focused segment.

Statistical significance was tested through chi-square statistics from the LCA model and complemented them with non-parametric comparisons (Kruskal–Wallis and, where appropriate, post-hoc Mann–Whitney U tests with Holm correction, see Section 2.4.1).

2.4.3 Market simulation (objective 3)

To address objective 3 to identify the share of preference for the innovation's levels in e-LCV configurations, the individual-level part-worth utilities derived from the HB estimation were incorporated into **preference-based market simulations**. Market simulations convert part-worth utilities into simulated choices and enable the reporting of the percentage of respondents projected to choose each product (Orme, 2010).

The simulations rely on individual-level part-worth utilities obtained from the HB estimation of 457 respondents (see chapter 3.1). For each respondent, total utility values were calculated for each vehicle configuration by summing the part-worth utilities associated with the attribute levels defining that product. These total utilities were used to identify relative preferences across the vehicle configurations, and aggregating the resulting preference outcomes across respondents results in shares of preference for each configuration. A **share of preference** represents the percentage of respondents projected to choose each product within a simulated market scenario, based on their estimated part-worth utilities (Orme, 2010).

The shares of preference were calculated through the **logit or Bradley-Terry-Luce model**, which allocates preference probabilistically across multiple alternatives and considers more information per respondent, than for example first-choice rules, resulting in more stable aggregate preference estimates (Orme, 2010; Orme, 2019).

Each simulation compares four vehicle configurations simultaneously:

- The **baseline vehicle,** and
- Three **advanced vehicles**, corresponding to levels (L) 2, 3, and 4 of each innovation included in the CBC analysis (multi-temperature zone, energy management system, and swap box).

The **baseline vehicle** reflects the reference vehicle configuration in all simulations:

- **Price:** €30,000 excl. VAT
- **Payload and cargo volume:** 600–900 kg / 6–8 m³ (fixed; does not influence the simulations)
- **Battery range:** 150–200 km (fixed; does not influence the simulations)
- **Multi-temperature zone:** No multi-temperature zone
- **Energy management system:** Standard driving
- **Swap box:** No swapbox

Table 2. Baseline and advanced vehicles used in the market simulation

Vehicles (baseline and advanced)	Purchase price (initial) level	Payload / volume level	Battery range level	Multi-temp. zone level	Energy manage-ment system level	Swap box level
Baseline	€30,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	No cooling	Standard driving	No swap box
Multi-temperature zone L2	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	**Single-zone cooling**	Standard driving	No swap box
Multi-temperature zone L3	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	**Double-zone cooling**	Standard driving	No swap box
Multi-temperature zone L4	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	**Multi-zone cooling**	Standard driving	No swap box
Energy management system L2	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	No cooling	**Eco driving**	No swap box
Energy management system L3	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	No cooling	**Advanced eco driving**	No swap box
Energy management system L4	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	No cooling	**Smart driving**	No swap box
Swap box L2	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	No cooling	Standard driving	**Basic swap box**
Swap box L3	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	No cooling	Standard driving	**Mobile swap box**
Swap box L4	€30,000 - €75,000 excl. VAT	600–900 kg / 6–8 m³	150–200 km	No cooling	Standard driving	**Smart foldable swap box**

For the advanced vehicles, three advanced e-LCV configurations were created for each innovation. Each advanced configuration differed from the baseline vehicle in exactly one attribute level, while all other attributes remained constant. The baseline vehicle represents a standard current e-LCV configuration, while the advanced configurations reflect increasing levels of the innovations, with lower levels currently already available on the market and the highest levels representing near-future innovations under development in Shift2Zero. The comparison of the four vehicle configurations was conducted simultaneously to identify which innovation level is most preferred.

To assess price sensitivity, the price of the advanced vehicles was varied across the simulated price points, €30,000, €45,000, €60,000, and €75,000, while the baseline remained fixed at €30,000. At each price level, utilities were converted into logit choice probabilities and averaged across respondents to obtain the simulated share of preference for each configuration.

3. Results

3.1 Sample description

3.1.1 Sample composition

The survey resulted in 2,137 responses in total, including 552 complete and 1,585 incomplete submissions collected across nine European countries. The incomplete submissions indicate respondents that opened the survey most likely to view or test the link, as most discontinuations occurred on the initial language selection (24%) or introduction page (11%). To prepare the data for analysis, several steps for data cleaning and quality checks were applied. Responses completed in less than five minutes were removed, as these were considered unlikely to reflect correct participation. Additional checks were carried out to identify and exclude respondents showing inconsistent answering patterns, such as straight-line behaviour (e.g. consistently selecting the first option). Respondents whose role or vehicle type did not match the scope of the study were also excluded, for example account or sales managers, or respondents reporting passenger cars as their delivery vehicle. Furthermore, all entries provided under the “other” option in key questions (including role, vehicle type, vehicle ownership, company type, delivery type, delivery area, and regulatory context) were reviewed manually to ensure correct categorisation and to avoid overlaps with predefined answer options. After applying these steps, the dataset consisted of 512 respondents that form the basis of the descriptive sample results reported in section 3.1.

To ensure alignment with the objectives of Shift2Zero and the focus on light commercial vehicles (LCVs), the sample used for the conjoint analysis (chapter 3.2, 3.3) and market simulation (chapter 3.4) was further restricted to respondents who reported using either diesel vans or electric vans in their daily operations. Users of other vehicle types, such as trucks, cargo bikes, e-cargo bikes, or micro-EVs (e.g. Paxsters), were excluded at this stage, as their operational characteristics differ from those of (e-)LCVs and did not fall within the technical scope of the project. Although Paxsters have four wheels, their lower payload and cargo volume classify them as micro-EVs rather than vans, while cargo bikes, e-cargo bikes, and trucks represent different vehicle categories in terms of size, design, and use case. The **final sample** used for the conjoint analysis and market simulations therefore consisted of **457 respondents**, representing **current users of diesel and electric vans**. This number aligns with Sawtooth’s rule of thumb to have min. 300 respondents in the full sample (Sawtooth Software, 2020). An overview table of the descriptive sample composition is provided in chapter 6.3 (Annex 3).

3.1.2 Respondent profile

In terms of the **user roles** (Q1: *“What is your role in your company?”,* one answer possible*),* most respondents are drivers (70.5%), including both employed (44.7%) and self-employed (25.8%) drivers. Managerial profiles represent 21.3%, comprising depot or branch managers (12.7%) and fleet managers at local (6.4%), regional (0.4%) or national (1.8%) levels. The remaining share who reported “other” roles includes, for example, users working in innovation, quality, sustainability, or other operational support functions (see Figure 4).

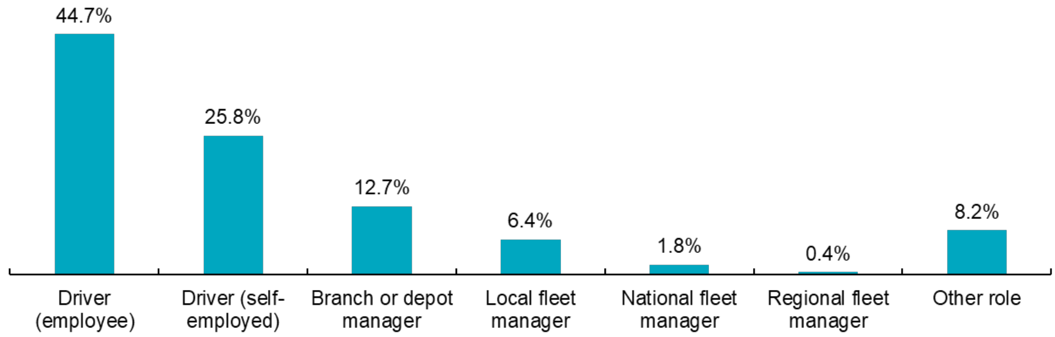

Figure 4. Distribution of user roles among respondents (N = 512)

Regarding the **company type** (Q5: *"What type of company do you work for?",* one answer possible), most respondents work for logistics service providers (70.9%), followed by specialised postal and parcel operators (17.0%). Smaller shares are employed by subcontractors or freelancers (6.3%), e-commerce or retail companies (3.3%), and municipalities or public operators (0.8%). An additional 1.7% report working for other types of organisations, such as event logistics or micromobility companies.

In terms of **countries** (Q6: *"In which country or countries do you primarily drive or manage delivery vehicle in your company?",* multiple answers allowed), respondents carry out their logistics activities mainly in the five Shift2Zero pilot countries: Poland (56.3%), Belgium (20.7%), Norway (9.6%), Greece (8.4%) and Italy (2.7%). Additional responses were collected from other European countries where relevant logistics companies are located, including Germany (2.7%), the Netherlands (2.1%), France (2.0%), Spain (1.2%), and other countries (1.2%). As multiple answers were allowed, each country was coded as a binary variable (1 = selected, 0 = not selected), and percentages represent the share of respondents (N = 512) selecting each option, the same approach was applied to other multiple-response questions.

With respect to **logistics experience** (Q7: *"How long have you worked in logistics, delivery operations, or a similar field?",* one answer possible) the sample of users is highly experienced. The majority of 59.6% report more than six years of experience in the operational logistics field, including 25.6% with over fifteen years of experience. Respondents with three to five years of experience represent 14.0%, while those with one to two years account for 15.8%. Only 5.0% report less than one year of experience.

3.1.3 Vehicle use characteristics

In regard of the **current main vehicle type** (Q2: *"What type of delivery vehicle do you primarily drive or manage in your job?",* one answer possible), the sample is dominated by users of diesel vans up to 3.5 tonnes (55.9%) and electric vans up to 3.5 without / 4.25 tonnes with exemption (33.4%) (see Figure 5). Other vehicle categories reported include trucks (5.7%), e-cargo bikes (2.1%), electric 3–4 wheelers such as Paxsters (1.4%), cargo bikes (0.8%), and other vehicle types (0.8%). As these vehicle categories differ in size, payload and operational characteristics from diesel and electric vans, they were excluded from the conjoint analysis and market simulation.

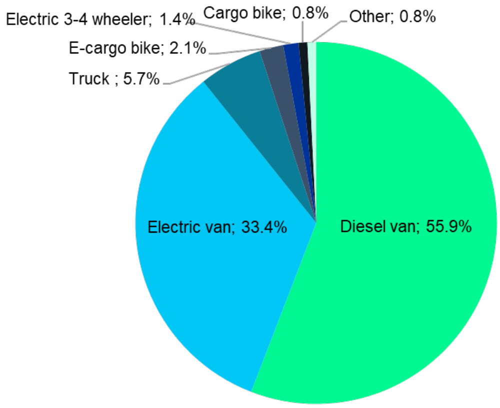

Figure 5. Distribution of current vehicle type among respondents (N = 512)

With respect to **experience with electric vans** among all respondents (Q3: *"Have you ever used, driven, or managed electric vans as part of your job now or in the past? If yes, how often?",* one answer possible), 33.4% of respondents report daily or almost daily use, 4.5% use them regularly (1–3 times/week), and 4.9% occasionally (1–3 times/month). A further 16.0% indicate past use of electric vans. At the same time, 33.0% report having no experience with electric vans, while 8.2% did not provide an answer. This sample composition ensures a balanced perspective across both experienced and non-experienced EV users.

Regarding **vehicle ownership models** (Q4: *"How are the delivery vehicles that you drive or manage for work primarily owned?",* multiple answers possible), most respondents operate vehicles that are owned by the company (43.8%) or leased by the company (33.4%) they work for. A further 16.2% report that their vehicle is provided by a subcontractor, while 14.6% use a personally owned vehicle and 10.0% a personally leased vehicle. Only 0.2% report another type of ownership, and 3.1% indicate that they do not know, reflecting the diverse organisational structures present in European last-mile delivery operations.

3.1.4 Delivery and operational context

In terms of **delivery type** (Q8: *"What kind of goods do you usually deliver in your company*?", multiple answers possible), most respondents are involved in postal and parcel delivery (83.4%), followed by e-commerce and retail goods (24.6%), pharmaceutical and medical products (18.9%), groceries and food deliveries (18.4%), and refrigerated or cold-chain goods (13.7%). A smaller proportion (5.7%) is involved in the delivery of other types of goods, such as construction materials, event equipment, or "diverse goods" (see Figure 6).

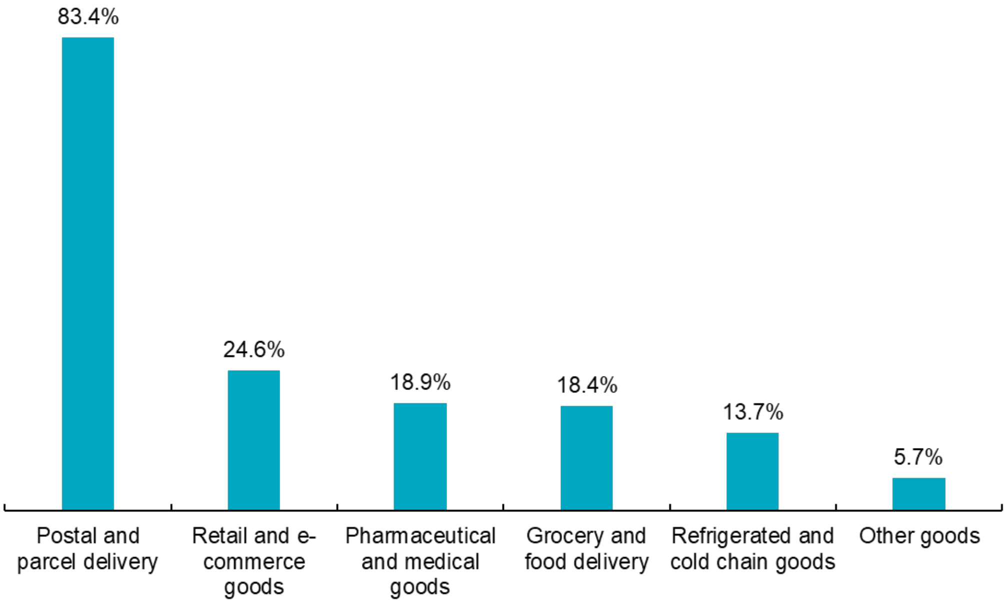

Figure 6. Distribution of delivery type among respondents (N = 512)

With respect to **delivery area** (Q9: *"In what type of area do you typically carry out deliveries in your company?",* multiple answers possible), the respondents report operating across a broad range of environments. Most respondents are active in city centres (62.9%), as well as in suburban (48.8%) and residential (48.8%) areas. Rural areas are covered by around half of the respondents (50.2%), and 32.6% report operating in industrial or logistics zones. Many respondents work across multiple types of delivery areas, reflecting multi-zonal routing patterns of last-mile delivery.

Regarding **regulatory context** (Q10: *"Do any of the following regulations affect your deliveries?",* multiple answers possible), most respondents (41.0%) are not frequently affected by operational restrictions. Among those who do face restrictions, the most common are time-based access rules (32.2%), weight or size limitations (25.4%), and noise or speed regulations (23.4%). In contrast, a smaller share of respondents' report operating in low-emission zones (19.7%) or zero-emission zones (9.2%) across the full sample. This likely reflects the fact that many respondents are located in regions or delivery contexts where low- or zero-emission schemes are not yet implemented, remain limited in scope, or are operationally avoided. Moreover, environmental access regulations across Europe are still evolving, which is illustrated by the 12.7% of respondents who expect new restrictions to be introduced in the future.

3.1.5 Challenges, preferences, and innovations of (e-)LCVs

In terms of **operational challenges** (Q18: *"What are the biggest issues you face with delivery vehicles in your company?"*, multiple answers possible), the full sample most frequently highlights limited battery range (53.3%) and high purchase price (49.8%) as the most critical issues with the delivery vehicles they commonly use. Other commonly reported challenges include limited payload and cargo space (39.8%), long charging times or limited access to charging infrastructure (33.0%), and difficulties finding suitable parking (30.1%). Additional issues mentioned by a smaller share of respondents concern insufficient heating or cooling (19.1%), limited loading systems (13.9%), limited safety features (8.0%), and inflexible cargo layout (7.8%) (see Figure 7).

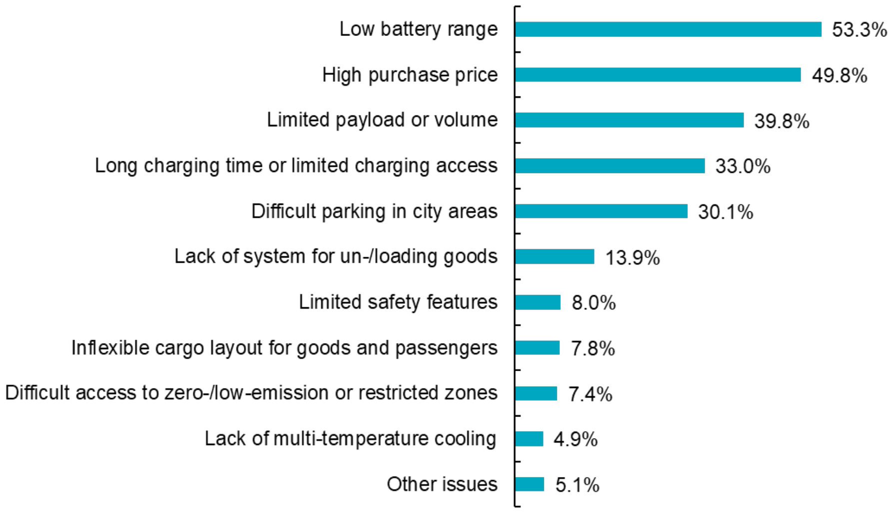

Figure 7. Main operational challenges among respondents (N = 512)

Regarding **vehicle feature preferences** (Q12: *"How important are the following features when using a delivery vehicle? (Please drag and drop the items to rank them from most to least important)"*, ranking task), purchase price is ranked as the most important feature (48.0%), even though the sample consists primarily of drivers rather than fleet or depot / branch managers. Battery range is the next most frequently ranked top priority (23.3%), followed by payload and cargo volume (12.5%) and total cost of ownership (12.3%). More innovative features, such as multi-temperature zones, flexible cargo layouts, and smart access systems, receive substantially lower priority (each below 1.0%), likely reflecting lower user familiarity with these concepts in current delivery operations.

This pattern is further reflected in respondents' **familiarity with vehicle innovations** (Q13: *"Have you ever used a delivery vehicle with any of the following innovations?"*, multiple answers possible). Most respondents (52.9%) report having never used any of the listed e-LCV innovations, including the multi-temperature zones, energy-management systems, and swap boxes used in the conjoint analysis, as well as other Shift2Zero-related solutions such as smart access (geofencing) features, modular swappable concept, dynamic space use, or thermal comfort (infrared cabin heating). Among respondents with previous experience, the most familiar innovations are energy-management systems (33.2%), followed by multi-temperature cargo systems (13.3%) and geofencing features (11.5%). A smaller share reports experience with flexible cargo layouts (7.6%) or swap boxes (7.6%). Overall, these results suggest that several of the innovations developed within Shift2Zero are still in the early stages of adoption across the respondents.

3.2 Choice-based conjoint analysis results (objective 1)

This section presents the results of the CBC analysis conducted with the selected **sample of 457 users of diesel and electric vans**. The aim of the CBC analysis is to quantify how logistics users of diesel and electric vans evaluate and trade off key vehicle features, namely purchase price, payload and cargo volume, battery range, multi-temperature zones, energy-management system, and swap boxes for e-LCVs.

Based on the utilities estimated using the Hierarchical Bayes method, section 3.2.1 presents general user preferences and trade-offs across the full sample. Sections 3.2.2 - 3.2.7 then examine differences in preferences across user groups defined by role, experience, vehicle type, delivery type, delivery area, and country. Section 3.3 reports the results of the latent class analysis identifying distinct user segments, and section 3.4 presents the market simulation results. Chapter 6.4 (Annex 4) shows detailed tables with the part-worth utilities and standard deviation of the CBC analysis for the full sample, and the differences by user group, experience level, vehicle type, delivery type, delivery area, and country.

3.2.1 Overall user preferences and attribute importance (RQ1a)

This section answers **RQ1a across the full sample (N = 457):** ***How do logistics users in Europe express preferences and make trade-offs between basic and innovative e-LCV features?*** The analysis was conducted using a CBC model estimated through Hierarchical Bayes (HB) procedures in Sawtooth Lighthouse Studio. The HB approach generated individual-level part-worth utilities, enabling a detailed understanding of the trade-offs respondents make between the six vehicle attributes included in the experiment. All utilities were zero-centred (zero-centred differences) to ensure comparability across attributes, and relative attribute importance was calculated based on the range of utilities within each attribute.

The attribute importance scores in Figure 8 show which vehicle characteristics users consider most important in real operational decisions. These show that users prioritise battery range (26.9%), followed by payload and cargo volume (22.4%) and purchase price (18.0%). Among the innovative attributes, multi-temperature zone shows the highest relevancy (13.5%), followed by energy-management support (9.6%) and the swap box (9.6%). All attributes significantly influenced respondents' choices ($p < 0.01$), except for the swap box, which plays a less decisive role in decision-making.

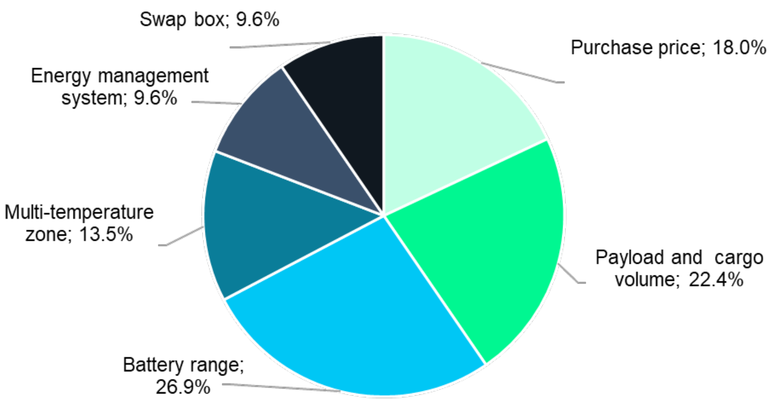

Figure 8. Attribute importance scores for the full sample (N = 457)

Battery range shows the clearest and strongest user preferences. As shown in Figure 9, users **strongly prefer a range of more than 200 km** (part-worth utility: +54.99) and accept a medium-large range of 150–200 km (+37.98). In contrast, ranges of 100–150 km (–13.09) are not suitable for their operations, while any range >100 km is not feasible operationally (–79.87). The additional questions reveal that most users currently use or own an e-LCV with a range of at least 150km (32.4%). The results suggest that a **battery range of around 150 km is required** to meet most users' logistics needs, while longer ranges above 200 km are generally preferred. This range needs to persist when the vehicle integrates the multi-temperature zones or the swap box, which may add additional weight or energy demand. This aligns with the market, as today's e-LCVs typically offer around 200 km of usable driving range for light vans and approximately 150–180 km for heavy vans (BloombergNEF, 2021).

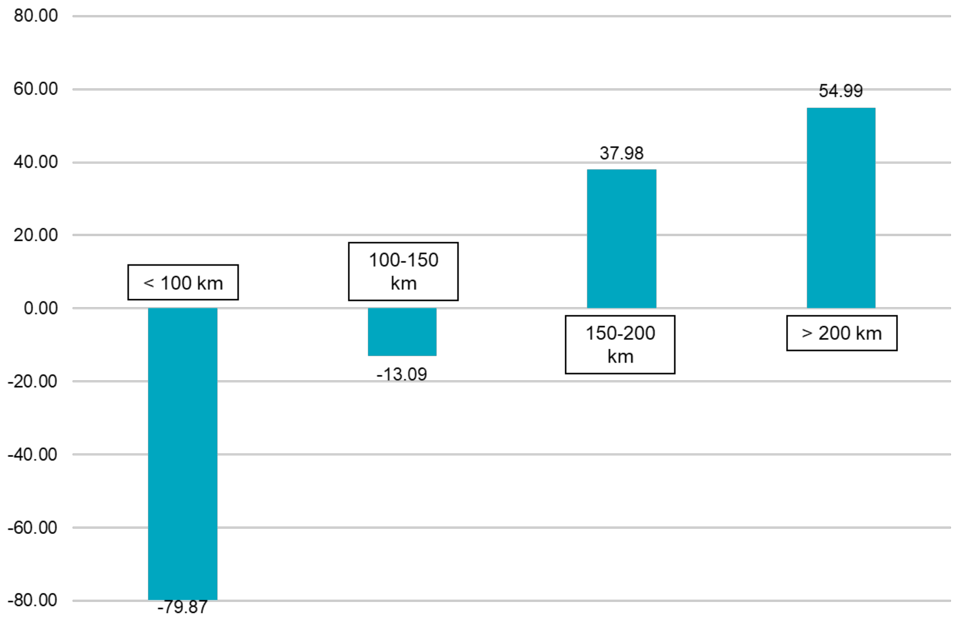

Figure 9. Part-worth utilities, battery range (N = 457)

Payload and cargo volume are the second most influential features in decision-making. Figure 10 shows that respondents **prefer large van configurations above 900 kg or 8–10 m³ (+31.67)** and **medium-large vehicles in the 600–900 kg / 6–8 m³ range (+29.29)**. In contrast, medium-small vehicles with 300–600 kg / 3–6 m³ (–8.10), and very small vans below 300 kg / 3 m³ (-52.85) do not support their logistics needs. This is reflected in the vehicles electric and diesel van users already operate, with most relying on 600–900 kg (26.9%) or >900 kg (25.6%) vans. It indicates a strong **tendency toward larger e-LCV classes**, even in contexts where space, access or weight restrictions may limit their practicality. Additional survey results show that almost half of users (48.6%) value payload and cargo volume equally, while more prioritise volume (31.2%) than payload (15.4%) alone, indicating that space often becomes a limiting factor in daily operations.

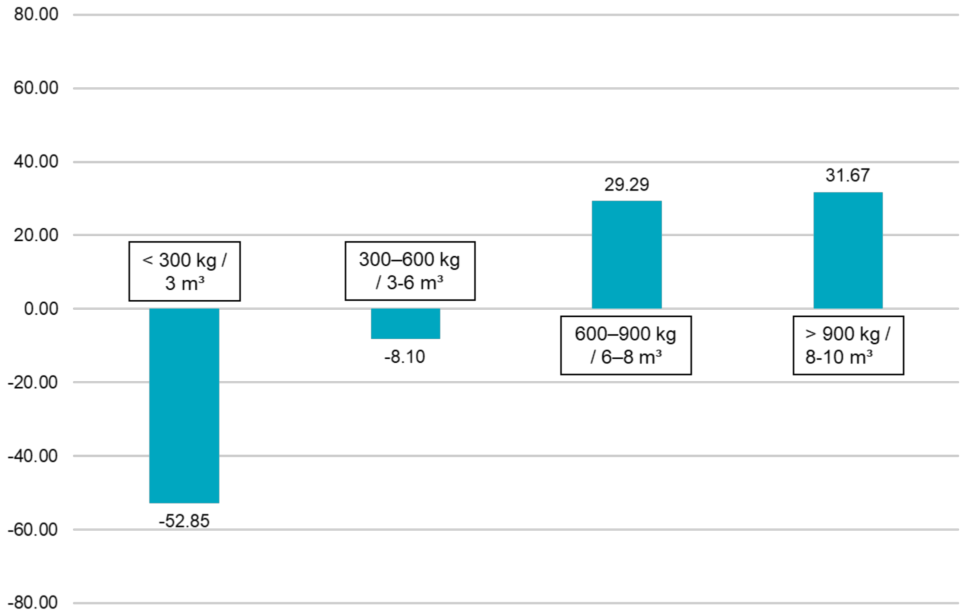

Figure 10. Part-worth utilities, payload and cargo volume (N = 457)

Purchase price is the third most important attributes. Figure 11 illustrates that users clearly value affordability and prefer lower prices such as €30,000 (+28.49) and €45,000 (+22.30). In contrast, higher prices like €60,000 (-10.29) and especially €75,000 (-40.49) are strongly disliked. Most current users report owning e-LCVs priced around €45,000 (40.5%), or more expensive ones around €60,000 (27.7%). Nevertheless, affordability remains a key decision criterion in e-LCV fleet adoption, implying that **innovations should not significantly increase purchase price**, with the **greatest perceived value found with a purchase price below €45,000 excl. VAT**. This aligns with the average purchase price of an e-LCV that is around €34,400 in the European market, while heavier electric van models are around €52,900 (Transport & Environment, 2022).

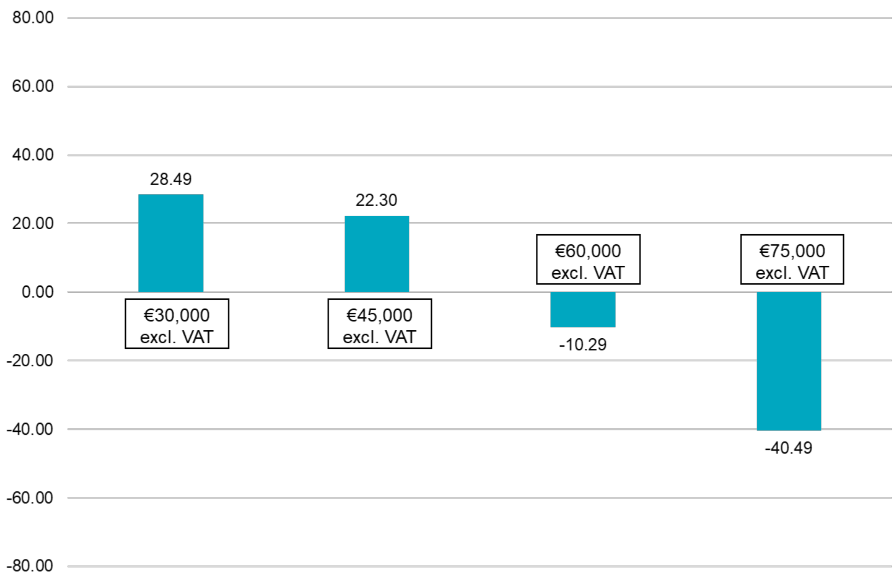

Figure 11. Part-worth utilities, purchase price (N = 457)

The multi-temperature attribute is the most valued innovation among those tested. Figure 12 visualises that respondents **prefer no cooling (+14.95) over all temperature-controlled configurations**, while single-zone (-2.80), double-zone (-6.82), and multi-zone systems (-5.34) receive negative utilities across the full sample. This is explained by the fact that most users do not require cooling in their operations (36.2%) or only need single-zone cooling (9.1%), with a relatively small share involved in cold-chain logistics (13.7%). It may also reflect perceived **trade-offs with affordability**, as more advanced cooling systems typically increase vehicle cost, and lower familiarity with specialised cooling equipment among general-purpose delivery users.

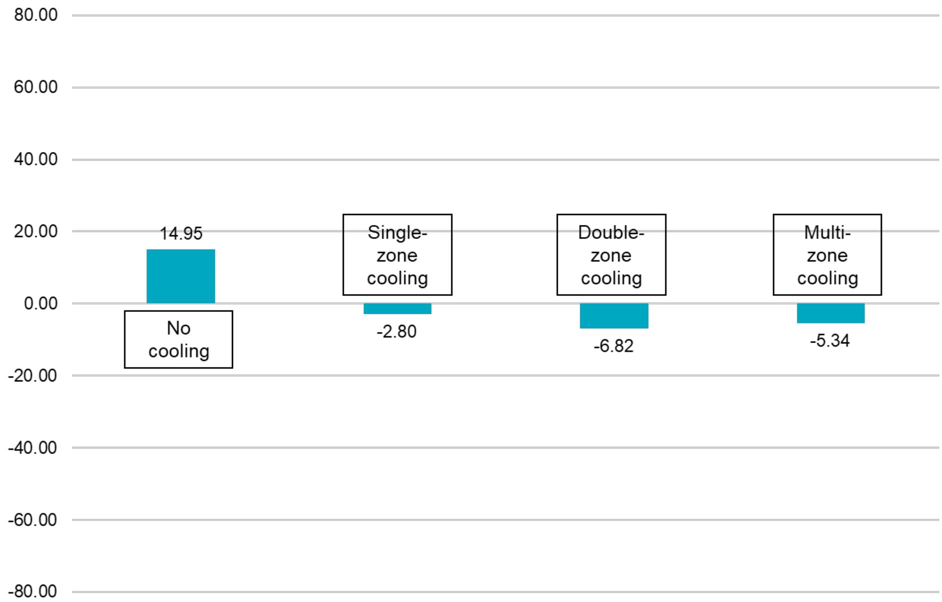

Figure 12. Part-worth utilities, multi-temperature zone (N = 457)

For the energy-management system, respondents show a clear preference for enhanced driving modes. Figure 13 shows that **eco-driving as standard mode in most e-LCVs receives the highest preference** (+7.61), **followed by smart driving** with dynamic energy adaptation (+6.02) and advanced eco-driving as intermediate solution (+3.33). In contrast, the standard driving mode is strongly disliked (–16.96), despite being the mode most users currently rely on (38.8%) alongside eco-driving (34.2%). These results indicate that the vehicle should support **a reliable eco-driving mode as a baseline,** while smart and advanced energy management systems provide additional value for the logistics operations.

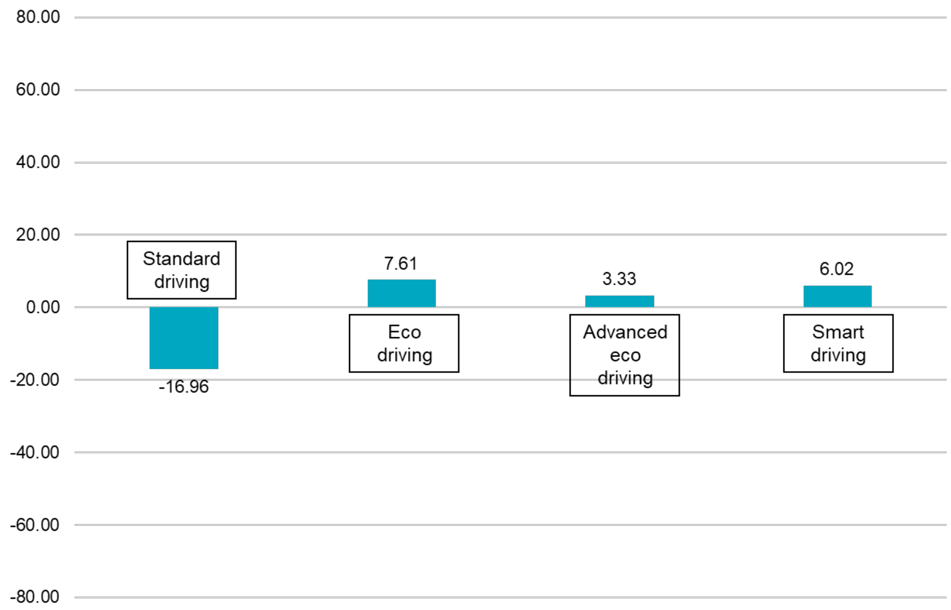

Figure 13. Part-worth utilities, energy management system (N = 457)

The swap box is the least important attribute. Figure 14 illustrates that respondents **prefer no swap box (+6.14),** while all concepts involving additional swap box variations are evaluated negatively. This includes the basic swap box (-0.93), mobile swap box (-1.22), and the smart foldable swap box is disliked more strongly (-4.00). This likely reflects users' limited familiarity with the swap box, as most have never used them (84.8%), combined with the constrained ability to fully illustrate the concept in the survey.

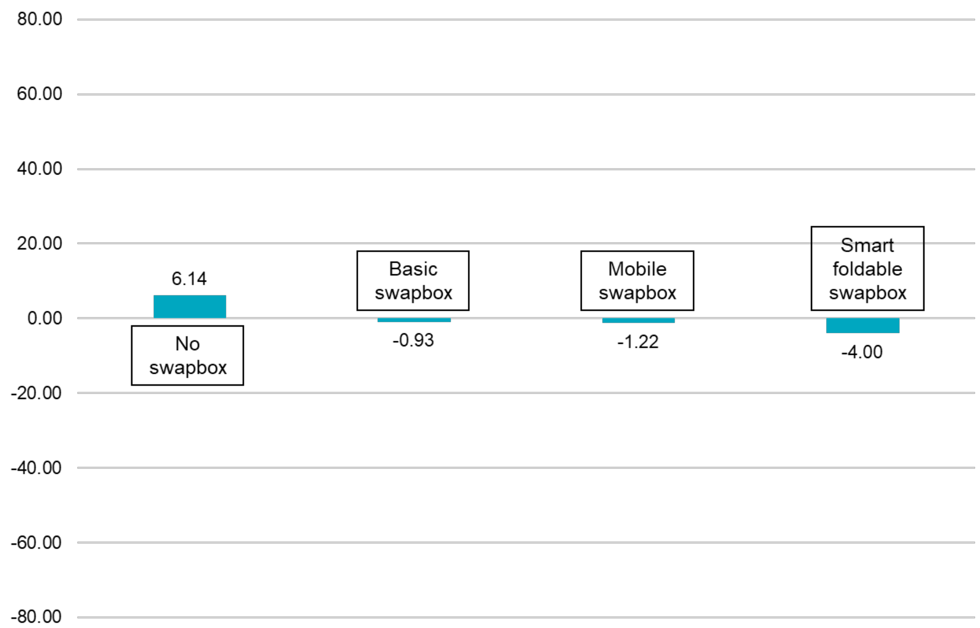

Figure 14. Part-worth utilities, swap box (N = 457)

Interaction effects between attributes

To assess whether user choices were influenced by combinations of vehicle features rather than by each attribute independently, all two-way interaction effects between attributes were tested within the covariate-extended HB model (see Figure 15). The figure illustrates the **pairwise interaction effects** in utilities between attribute levels from the conjoint model. Darker green values represent stronger interaction effects, medium green shades indicate moderate interaction effects, and light green or white cells reflect weak or no interaction effects. The darkest green is used for the strongest positive interaction, and the palest shade for the weakest interaction per attribute pair. The strongest interactions across the attribute pairs occur **between battery range and purchase price**, **purchase price and multi-temperature zones**, and **payload / cargo volume and battery range**.

Preferences for battery range are not linear with purchase price, since **medium ranges (100-200 km) are most attractive at the lowest level of purchase price (€30,000)**. Short ranges (<100 km) show higher relative acceptance at higher prices, reflecting relative trade-offs within the choice experiment rather than absolute preferences. Long ranges (>200 km) add comparatively little value as price rises. The interaction shows that although users consistently prefer long ranges, they are less willing to pay a premium for additional battery range as purchase price increases.

A similar price-sensitive pattern is observed for multi-temperature zones. Single-zone cooling is viewed positively at low purchase prices, while **double-zone and multi-zone cooling become more acceptable at mid-range prices (around €60,000)**. At the highest purchase price (€75,000), however, respondents tend to prefer no cooling at all, indicating stronger price sensitivity for more advanced and expensive variations. This may also reflect the sample composition, since only 13.7% of respondents report being active in the cold chain delivery sector.

Payload and battery range also interact strongly. **Small vans (<300 kg) are acceptable mainly when paired with short ranges**, **whereas large vans (>900 kg) are valued primarily in combination with long ranges (>200 km)**. This reflects realistic patterns of operational fit and also aligns with technical trade-offs, as long-range batteries reduce payload capacity and are therefore more feasible in larger vehicles.

The interaction between payload and energy-management system shows that the perceived value of energy-saving modes depends on the vehicle size. Respondents operating **mid-sized vans (300-600 kg) show clear preferences for eco-driving and advanced eco-driving modes**, whereas those using large vans tend to accept standard driving. Users of small vans show more mixed preferences and, in some cases, prefer smart driving.

Battery range further interacts with the multi-temperature zones. Respondents clearly **prefer no cooling for short-range vehicles**, while the **acceptance of advanced cooling features increases with longer battery ranges**. Multi-zone cooling becomes more valued when the vehicle has over 200 km of range, suggesting that users consider sufficient autonomy a precondition for integrating advanced cooling features.

Preferences for the energy-management system vary across purchase price levels, **smart driving is valued at lower prices**, **eco-driving and advanced eco-driving become more important at medium prices (€45,000-€60,000)**, and preferences become inconsistent at the highest price level, where smart driving is often rejected. This pattern suggests that users value energy-saving features, but while smart driving is seen as a valuable addition at low prices, its perceived incremental value appears to diminish at the highest price level.

Finally, preferences for swap box and battery range interact. For **short-range vehicles (<100 km), respondents prefer basic or smart swap boxes**, while **for medium ranges (100-150 km) they value mobile swap boxes**. For long-range vehicles (>200 km), swap boxes are not selected, likely indicating a stronger prioritisation of battery range and payload capacity over the transshipment benefits offered by the swap box.

Purchase price x battery range (p>0.79)

	<100 km	100-150 km	150-200 km	>200 km
€ 30,000	-0.09734	0.08394	0.04671	-0.03331
€ 45,000	-0.02995	-0.06430	0.05101	0.04324
€ 60,000	0.06050	-0.01274	-0.02328	-0.02449
€ 75,000	0.06679	-0.00691	-0.07444	0.01456

Purchase price x multi-temperature zone (p>0.49)

	No cooling	Single-cooling	Double-cooling	Multi-cooling
€ 30,000	-0.03793	0.06534	0.01685	-0.04426
€ 45,000	0.01624	-0.07787	0.00729	0.05433
€ 60,000	-0.11314	0.00738	0.02641	0.07935
€ 75,000	0.13483	0.00514	-0.05055	-0.08943

Payload/volume x battery range (p>0.52)

	<100 km	100-150 km	150-200 km	>200 km
<300 kg/3 m³	0.14460	-0.01047	-0.08062	-0.05352
300–600 kg/3-6 m³	-0.04735	0.03485	0.04194	-0.02944
600–900 kg/6–8 m³	-0.02350	0.00609	0.07392	-0.05650
>900 kg/8-10 m³	-0.07375	-0.03047	-0.03524	0.13946

Payload/volume x energy management system (p>0.74)

	Standard driving	Eco driving	Adv. eco driving	Smart driving
<300 kg/3 m³	0.02128	-0.02680	-0.01652	0.02204
300–600 kg/3-6 m³	-0.13003	0.08640	0.05630	-0.01267
600–900 kg/6–8 m³	0.02959	0.02646	-0.03027	-0.02579
>900 kg/8-10 m³	0.07916	-0.08606	-0.00951	0.01642

Battery range x multi-temperature zone (p>0.94)

	No cooling	Single-cooling	Double-cooling	Multi-cooling
<100 km	0.05787	0.01104	0.03577	-0.10468
100-150 km	-0.00657	-0.00240	-0.03589	0.04486
150-200 km	0.02686	-0.02805	-0.00187	0.00306
>200 km	-0.07816	0.01941	0.00198	0.05676

Purchase price x energy management system (p>0.70)

	Standard driving	Eco driving	Adv. eco driving	Smart driving
€ 30,000	-0.03065	0.00115	-0.02392	0.05341
€ 45,000	-0.09213	0.02527	0.04595	0.02091
€ 60,000	0.09888	0.00902	-0.10382	-0.00409
€ 75,000	0.02389	-0.03544	0.08178	-0.07023

Battery range x swap box (p>0.86)

	No swapbox	Basic swapbox	Mobile swapbox	Smart fold. swapbox
<100 km	-0.03183	0.06800	-0.07793	0.04177
100-150 km	-0.02362	0.02526	0.08480	-0.08644
150-200 km	-0.00466	-0.03534	-0.00022	0.04022
>200 km	0.06012	-0.05792	-0.00665	0.00446

Highest and lowest interaction | High interaction | Medium interaction | Low or no interaction

Figure 15. Interaction effects between attributes, interaction part-worths (N = 457)

3.2.2 Differences by user role (RQ1b)

This chapter answers **RQ1b: *"How do preferences and trade-offs differ across user roles?"*.** The analysis is based on a covariate-extended Hierarchical Bayes (HB) model and non-parametric significance testing. Five groups of user roles were analysed that emerged from answer categories in the survey. These include **employee drivers (N =**

214), **self-employed drivers (N = 126)**, **fleet managers (N = 37)**, **branch and depot managers (N = 56)**, and **other roles (N = 24)** such as innovation, sustainability or support functions. Group differences in utility values were statistically assessed using Kruskal–Wallis tests with post-hoc Mann–Whitney U tests. All tests were conducted as non-parametric null-hypothesis tests, with significance assessed at the 5% level ($p < 0.05$). Attributes showing statistically significant differences are marked with "*".

In terms of the attribute importance (Figure 16)**, drivers prioritise battery range, while managers place greater emphasis on payload capacity** in their operational priorities. Drivers assign the highest importance to battery range (employee: 27.2%; self-employed: 27.7%), while payload and volume (employee: 20.0%; self-employed: 21.0%) as well as purchase price (employee: 15.5%; self-employed: 19.1%) follow at a lower level. In contrast, fleet managers place greater value on payload and volume (29.0%) ahead of range (21.9%) and price (14.8%), due to their focus on fleet and delivery planning. Branch and depot managers show a similar pattern to fleet managers, with the highest importance for payload (22.0%) and range (20.6%). Other roles, such as innovation or sustainability managers, attach more importance to multi-temperature zones (21.8%) and payload (20.4%), indicating that such users are more open to employing new innovations.

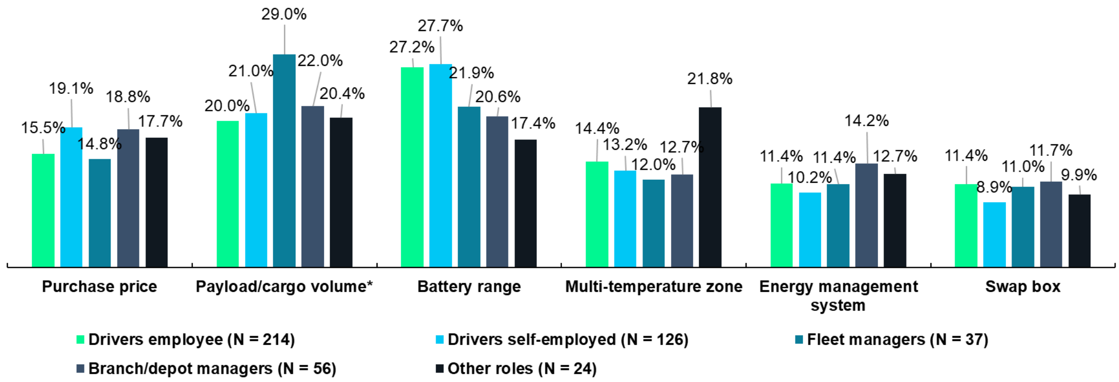

Figure 16. Average attribute importance (%), by user role (N = 457)

Payload and cargo volume* is the only attribute where differences between different user roles are **statistically significant ($p < 0.05$)**. Fleet managers and branch managers show higher preferences for very small payloads (<300 kg) than employee drivers (fleet managers: -102.39; branch managers: -50.95; employed drivers: -37.56), with pairwise tests confirming that employee drivers reject this category significantly more strongly ($p < 0.05$). Self-employed drivers value medium payloads (300-600 kg) more negatively (–21.43) than fleet managers (+19.34), and this difference is statistically significant ($p < 0.05$). Branch managers also reject medium payloads (-20.97) significantly more strongly than fleet managers ($p < 0.05$). Finally, for the largest payload category (>900 kg), branch managers display significantly higher preference (+43.25) than employee drivers (+18.82; $p < 0.05$). These results suggest that **managers' preferences are spread across payload classes to match different operational needs**, whereas **drivers focus on configurations that reduce the number of trips and make loading easier**, namely medium-large and large vans.

For **purchase price**, no significant differences are found in the preferences of different user groups (p ≥ .05). All groups prefer €30,000 most strongly, while €75,000 is rejected by every subgroup. Self-employed drivers show comparatively high acceptance of €45,000 (+24.08), while fleet managers reject €75,000 most strongly (-47.39). This suggests that drivers, despite not being involved in purchasing decisions, and managers all prefer affordable e-LCVs below €45,000.

Preferences for **battery range** are similar across roles and show no significant differences (p ≥ .05). All subgroups strongly prefer >200 km (employee drivers +61.42; self-employed +56.57; fleet managers +40.20; branch managers +39.64) and strongly reject very short ranges <100 km. The relative rejection of <100 km is slightly weaker among managers (fleet -74.26; branch -70.01) than among drivers (-78.61 / -77.81), but these differences are not statistically significant.

Preferences for **multi-temperature zones** also do not differ significantly (p ≥ .05). All groups prefer no cooling, though managers evaluate it more positively (fleet +25.83; branch +22.70) than drivers (employee +18.16; self-employed +14.08). Double- and multi-zone cooling are typically disliked, except among “other roles”, where specialised cooling capabilities are valued positively.

For **energy-management support** (p ≥ .05), all groups strongly reject standard driving mode. Employee drivers favour advanced eco-driving (+5.80) and smart driving (+4.02), self-employed drivers strongly prefer eco-driving (+19.24), and fleet managers show a strong preference for smart driving (+30.50). Branch managers prefer eco- and advanced eco-driving, while “other roles” reject smart driving but value eco-driving highly.

For the **swap box**, no statistically significant differences are observed (p ≥ .05). Most groups prefer no swap box, except fleet managers and branch managers, who show a slight preference for the basic version. “Other roles” prefer having a swap box, particularly the mobile variant, likely reflecting specialised operational models.

3.2.3 Differences by level of experience (RQ1c)

This chapter answers **RQ1c: *“How do preferences and trade-offs differ across experience level?”.*** Experience was captured through respondents’ self-reported years working in logistics, delivery operations, or related fields. Three groups were analysed, namely **low experience (≤2 years, N = 83)**, **medium experience (3–10 years, N = 202)**, and **high experience (≥11 years, N = 172)**. As in the previous subsection, group differences were tested using the covariate-extended HB model and Kruskal–Wallis and Mann–Whitney U tests (attributes that show significant differences are marked with “*”).

The importance levels of the attributes (Figure 17) do not vary much by level of experience. In all three groups, battery range is the most important attribute (low 24.1%; medium 26.9%; high 26.3%), followed by payload and cargo volume (low 16.7%; medium 22.9%; high 22.4%) and purchase price (low 17.3%; medium 16.9%; high 18.2%). The innovative attributes remain less influential for all users, though low-experience respondents assign slightly higher importance to multi-temperature zones (15.9%) and the swap box (13.2%) than medium- (13.7% and 9.8%) and high-experience users (12.9% and 10.4%). Energy-management support shows the lowest importance across all groups (12.8% / 9.8% / 9.9%).

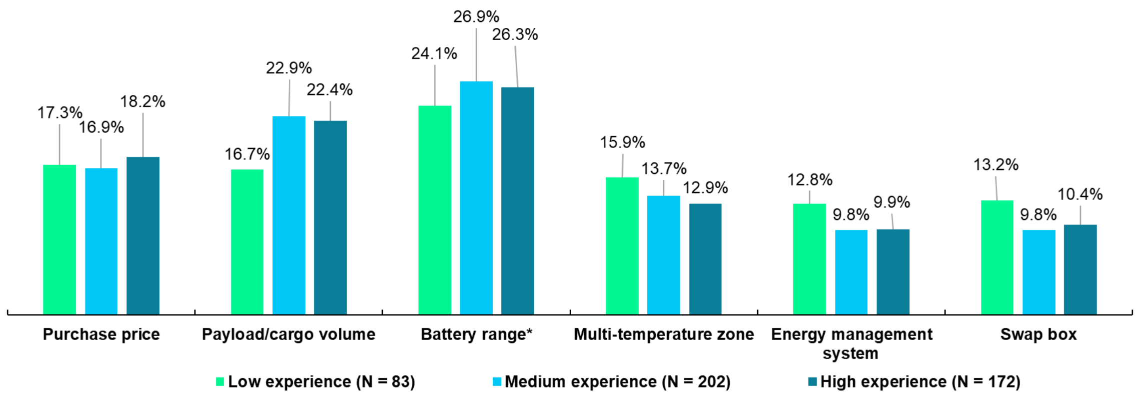

Figure 17. Average attribute importance (%), by experience level (N = 457)

For **purchase price**, no significant differences are found (p ≥ .05). All experience groups prefer €30,000 most strongly (low +15.35; medium +20.63; high +32.97) and consistently reject €75,000 (low -37.03; medium -30.80; high -45.94). The low-experience subgroup accepts the purchase price of €60,000 (+4.91), while the medium- (-14.36) and high-experience (-8.39) reject it.

Preferences for **payload and cargo volume** show no significant differences (p ≥ .05). All groups strongly prefer large (>900 kg; low +25.54; high +33.63) or medium-large vans (600–900 kg / 6–8 m³; medium +39.47) and reject very small vans (<300 kg; low -34.70; medium -61.95; high -48.12).

Battery range* shows statistical differences across experience levels at the **100-150 km level** (Kruskal–Wallis p = .048). **Medium-experience users clearly reject the range of 100-150km (-24.51), while high-experience users show slight acceptance (+1.52)** with statistical significance (Mann–Whitney p = .013). This suggests that users with more experience in logistics may be more familiar with actual range requirements or therefore tolerate less range. Otherwise, all experience levels prefer large ranges above 200 km (low +42.78; medium +57.28; high +48.25) and reject ranges below 100 km (low -65.80; medium -72.75; high -85.94).

Preferences for **multi-temperature zones** do not differ significantly across the experience groups (p ≥ .05). Medium- and high-experience users prefer no cooling (medium +12.37; high +23.79), while low-experience users prefer multi-zone cooling (+7.33) slightly over no cooling (+6.88).

For the **energy-management system**, group differences are also non-significant (p ≥ .05). Standard driving is rejected across all experience levels (low -16.06; medium –10.35; high -14.74). Low-experience users show the strongest preference for smart driving (+22.05), medium-experience users prefer eco-driving (+6.57), and high-experience users value eco-driving (+11.39) most clearly.

Finally, preferences for the **swap box** show no significant differences between experience groups (p ≥ .05). Medium- and high-experience respondents prefer no swap box (medium +10.60; high +6.86), while low-experience users clearly prefer the basic swap box (+10.40), but still reject the mobile (-1.33) and smart foldable swap box (-5.91).

3.2.4 Differences by vehicle type (RQ1d)

This chapter answers **RQ1d: *"How do preferences and trade-offs differ across vehicle type?"***. It examines how preferences differ between electric and diesel van users, based on the type of vehicle they primarily drive or manage (Q2). Two groups were analysed, including **electric van users (N = 174)** and **diesel van users (N = 286)**. Differences were assessed using the covariate-extended Hierarchical Bayes (HB) model, complemented by Mann–Whitney U tests with Holm correction for multiple comparisons (attributes that show significant differences are marked with "*").

The attribute importance values (Figure 18) are similar across electric and diesel van users. In both groups, battery range is the most important attribute (electric 26.8%; diesel 26.2%), followed by payload and cargo volume (electric 19.4%; diesel 23.1%) and purchase price (electric 16.9%; diesel 18.6%). Electric van users assign slightly higher importance to multi-temperature zones (14.7%) and energy-management support (11.9%) than diesel van users (13.0% and 9.2%, respectively), whereas diesel users place somewhat more emphasis on payload and price. The swap box remains the least important attribute in both groups (electric 10.4%; diesel 10.0%).

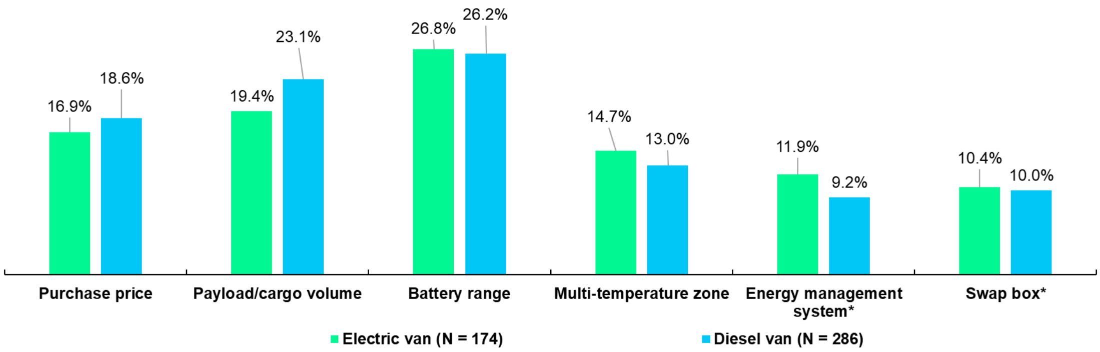

Figure 18. Average attribute importance (%), by vehicle type (N = 457)

Purchase price does not show any statistically significant differences between electric and diesel van drivers ($p \geq .05$). Both groups prefer lower purchase prices and strongly reject €75,000 (electric -44.78; diesel -35.89). Electric van users evaluate €30,000 (+19.22) and €45,000 (+20.30) similarly, while diesel users show a stronger preference for €30,000 (+33.98) than for €45,000 (+23.02). Electric van users are slightly more accepting of €60,000 (+5.25), whereas diesel van users clearly reject it (-21.11). This suggests that electric van users may be more used to and accepting of the higher cost of electric vans, while diesel users express stronger price sensitivity.

For **payload and cargo volume**, the differences are not statistically significant ($p \geq .05$), but the two groups show different preferences. Diesel van users strongly prefer the largest payload class (>900 kg; +38.68), while electric van users show their highest preference for the medium-large class (600-900 kg; +28.86). Both groups reject very small vans (<300 kg), although rejection is stronger among diesel van users (-55.76) than among electric van users (-42.88).

Battery range does not show statistically significant differences either (p ≥ .05). Electric van users show a slightly higher preference for the medium-large range (150-200 km; +40.15), while diesel users value the >200 km range most (+52.14). Both groups reject short ranges <150 km, with very short ranges <100 km strongly rejected by diesel (-75.77) and electric van users (-83.82). This suggests that both groups view range as a means for operational autonomy, regardless of the vehicle type.

The **multi-temperature zone** innovation does neither show significant differences (p ≥ .05). Both groups prefer no cooling, although electric van users evaluate multi-zone cooling more positively (+5.73) than diesel users (-11.73). Electric van users clearly reject single-zone (-8.67) and double-zone cooling (-6.22), whereas diesel van users show a slightly higher tolerance for single-zone cooling (+1.99). These patterns may indicate that electric-van users are more accustomed to specialised delivery setups and may associate these configurations with potential impacts on battery efficiency.

The **energy management system* shows significant differences for advanced eco-driving** (p = .004, small effect size). **Electric van users clearly prefer advanced eco-driving (+15.13) and value smart driving (+4.03)**, whereas diesel users reject advanced eco-driving (-8.65) but appreciate eco-driving (+10.87) and smart driving (+6.64). Both groups reject the standard driving mode, particularly electric van drivers (electric -19.55; diesel -8.86). These differences likely reflect that **electric van users benefit more from advanced energy improvement** in contrast to diesel users who see limited added value beyond basic eco-driving.

The **swap box* shows a small but significant difference for the mobile swap box** (p = .016, r ≈ .12). **Electric van users prefer the mobile swap box (+7.53) and slightly value the basic version (+2.20)**, while diesel users reject both (mobile -6.31; basic -4.25). Diesel users show near-indifference towards the smart swap box (+0.01), whereas electric users strongly reject it (-9.06). This might indicate, for example, that **electric van users are more familiar with multimodal or transshipment-oriented concepts**.

3.2.5 Differences by delivery type (RQ1e)

This chapter answers **RQ1e: "How do preferences and trade-offs vary by delivery type?".** Delivery type was captured by respondents' self-reported operational domain and includes six groups: **postal and parcel delivery (N = 399)**, **grocery and food delivery (N = 77)**, **cold-chain delivery (N = 54)**, **medical product delivery (N = 78)**, **retail and e-commerce delivery (N = 104)**, and **other delivery types (N = 19)**. Variation by delivery type is interpreted as differences in preferences associated with operating in specific delivery contexts, rather than as differences between mutually exclusive delivery-type user groups. As delivery type was a multi-response question, respondents reported operating across multiple delivery types, and the Ns therefore reflect delivery contexts rather than mutually exclusive respondent groups. Accordingly, each delivery type was analysed separately as a binary indicator (selected vs. not selected), comparing respondents who reported operating in each delivery context with those who did not. Differences in utilities were assessed using the covariate-extended Hierarchical Bayes (HB) model, complemented by Kruskal–Wallis tests with post-hoc Mann-Whitney U comparisons (attributes that show significant differences are marked with "*").

The attribute importance across delivery types (Figure 19) shows that the relative ordering for parcel and postal delivery contexts follows that of the overall sample, reflecting their large share of the sample (87.3%). Operations in postal and parcel delivery contexts place emphasis on battery range (28.9%) and payload and cargo volume (21.4%), while placing less importance on purchase price (16.3%). Grocery and food delivery attribute higher importance to payload and volume (25.5%), followed by battery range (21.3%) and multi-temperature zones (16.2%). Cold-chain operations also prioritise cooling (16.1%) nearly as much as purchase price (17.1%), alongside the importance for payload and volume (20.8%) and battery range (24.7%). Medical delivery contexts show an almost equal emphasis on payload and volume (24.6%) and battery range (24.1%). Retail and e-commerce delivery, in contrast, closely resemble the overall sample, with payload and cargo volume (25.5%) and battery range (23.5%) as dominant attributes.

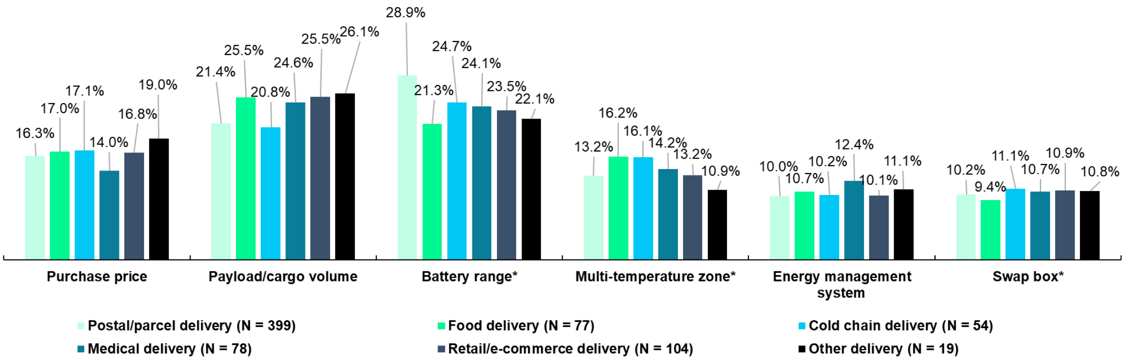

Figure 19. Average attribute importance (%), by delivery type (N = 457)

Preferences for **purchase price** do not differ significantly across delivery types ($p \geq .05$). All delivery types strongly prefer lower prices and reject the €75,000 level. Utilities for €30,000 range between +15.35 (medical delivery) and +40.75 (food delivery), while €75,000 is consistently disliked across delivery segments, with the strongest rejection found among food delivery (-40.6) and other delivery types (-40.73). Intermediate price levels are viewed similarly across delivery types, with only slight variation in the acceptance of €45,000 and €60,000.

Preferences for **payload and cargo volume** do not differ significantly across delivery types ($p \geq .05$). All delivery types strongly reject very small vans (<300 kg). Postal/parcel (+31.92), retail (+55.80), cold-chain (+43.48), and medical (+46.77) delivery operations all show a clear preference for the largest vans (>900 kg). In food delivery contexts, preferences for medium-large (+42.97) and largest van (+42.53) are almost the same. “Other deliveries” also differ from all other segments by preferring the medium-large class most strongly (+61.68) over the large vans (+24.61).

Battery range* shows statistical difference in the lowest range <100 km and largest range >200 km for the postal and parcel delivery type ($p < .05$). More precisely, operating in postal and parcel delivery contexts is associated with **the strongest preference for >200 km (+58.27)** and the strongest rejection of <100 km (-85.39). Preferences in food, cold-chain, medical, and retail delivery contexts follow a similar pattern, with strong preferences for >200 km (ranging from +49.62 to +62.15) and accepting 150–200 km, while rejecting shorter ranges below 150 km. In “other delivery” contexts, preferences deviate slightly, with positive utilities for both >200 km (+33.58) and 100-150 km (+23.80), and weaker preference for the intermediate 150-200 km option. Across all delivery types, very short ranges (<100 km) are strongly rejected.

The **multi-temperature zone* shows significant differences primarily in the no-cooling option for postal, food, cold-chain, and medical delivery, and in double-zone cooling for food and cold-chain delivery** ($p < .05$). Overall, cooling needs follow the operational logic of each delivery sector, namely postal and retail operations require no cooling (postal +22.94; retail +18.24) within their core activities**. Food and cold chain operations** show the need to transport goods at different temperature zones, **with a preference for double-zone cooling** (food +22.32; cold chain +14.36), and multi-zone cooling (food: 9.46; cold chain: 10.33). The **stronger utilities for food delivery contexts** likely reflect that many food operations combine chilled and ambient products on the same route, requiring a broader mix of tem**perature needs. In medical delivery contexts, double-zone** (+12.66) and multi-zone cooling (4.94) are most valued. This may indicate, however, that two compartments suffice and more complex systems cause cost trade-offs. Other deliveries show a mixed pattern, valuing mostly multi-zone (+21.90) or no cooling (+16.50).

Energy-management system does not have statistical differences across delivery types ($p \geq .05$). Across most delivery contexts, preferences indicate rejection of standard driving in favour of some form of energy management. In postal delivery, the preferences are smart driving (+6.89) and eco driving (+6.30), with advanced eco driving also accepted (+4.30). Food delivery contexts show a strong preference for smart driving (+14.07) and moderate appreciation for standard driving (+6.26). Cold-chain delivery contexts similarly focus on smart driving (+4.47) and accept eco driving (+1.25) but reject both standard and advanced eco driving. Medical delivery users show the strongest preference for eco driving (+23.46) and less acceptance for standard driving (-22.10). Retail delivery contexts mainly favour eco driving (+15.26), view smart driving as neutral, and reject both standard and advanced eco driving. “Other deliveries” show positive values for smart driving (+6.44) and advanced eco driving (+3.04).

The **swap box* has statistically significant differences among postal delivery operations, who significantly prefer no swap box and significantly reject the basic swap box** (Mann-Whitney, no swap box $p = 0.003$, and basic swap box $p = .013$). Postal and retail delivery contexts show a clear preference for no swap box (postal +9.24; retail +9.01), and both strongly reject smart or basic versions. Food and medical delivery contexts indicate interest in swap boxes, especially the mobile (food +4.84) or basic options (medical +5.69). This aligns with their need to handle multiple product types or transfer loads efficiently between vehicles or storage points. Cold-chain operations similarly show a preference for the basic (+8.44) and mobile (+2.80) swap boxes but less value for the smart version (-11.47), possibly due to complexity or incompatibility with temperature-controlled workflows. Other deliveries form the most distinct subgroup, with strong preferences for the basic swap box (+22.83) over no swap box (-12.86) and negative evaluations of mobile (–2.38) and smart configurations (-7.58).

3.2.6 Differences by delivery area (RQ1f)

This chapter answers **RQ1f: *“How do preferences and trade-offs vary by delivery area?”.*** The analysis examines preferences associated with six delivery areas based on respondents reported operating contexts: **city centre (N = 286)**, **city periphery (N = 222)**, **residential areas (N = 226)**, **industrial areas (N = 142)**, **rural areas (N = 233)**, and **"other" areas (N = 3)**. Similar as delivery type, delivery area was captured as a multi-response variable, with respondents typically operating across multiple delivery areas. The reported Ns therefore represent preferences associated with operating in each delivery contexts rather than exclusive groups. Accordingly, each delivery area was analysed separately as a binary indicator (selected vs. not selected). Differences were assessed using the covariate-extended Hierarchical Bayes (HB) model, supplemented by Mann–Whitney U tests with Holm correction (attributes showing statistically significant differences are marked with "*").

Across delivery areas, attribute importance patterns (Figure 20) are broadly consistent, with battery range and payload & cargo volume remaining key priorities in all areas. This convergence is possibly attributable to respondents operating across multiple delivery areas, resulting in shared baseline requirements. Operations in city centres place emphasis on payload (23.9%) and range (24.2%), while assigning less weight to purchase price (19.6%). In urban periphery areas, range becomes more dominant (26.3%), followed by payload (23.4%) and purchase price (18.9%). Residential delivery contexts follow a nearly identical pattern, with range (26.0%) and payload (24.6%) clearly leading. Operating in rural areas is associated with the strongest emphasis on range (29.9%), ahead of payload (22.0%) and purchase price (16.0%), likely reflecting greater autonomy requirements due to longer travel distances.

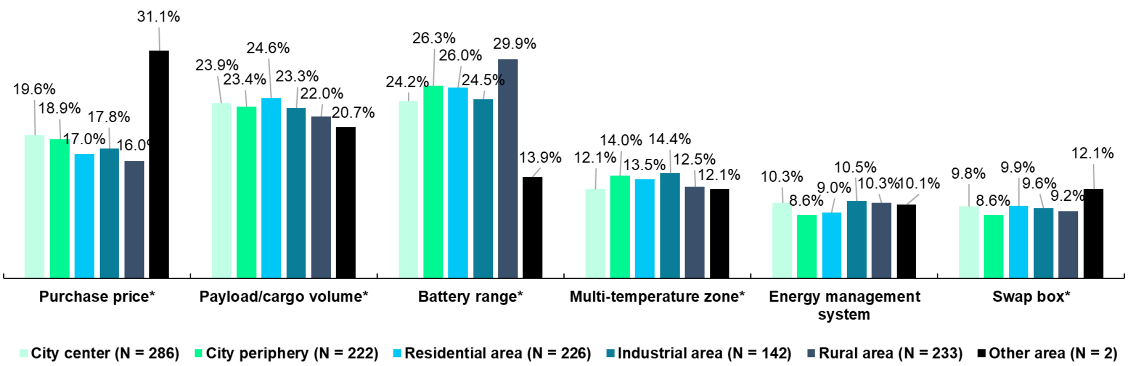

Figure 20. Average attribute importance (%), by delivery area (N = 457)

Purchase price* shows significant differences only at the €75,000 price point for city-centre contexts (Holm-adjusted p = .016) **and urban periphery areas** (Holm-adjusted p = .008). **Respondents operating in city centre (-50.50) as well as urban periphery (-50.15) reject the €75,000 option significantly**, likely reflecting cost pressure in urban delivery contexts with many stops and tight margins. Across all delivery areas, the €30,000 van is clearly preferred (utilities between +25.96 and +37.00), followed by the €45,000 option (+21.29 to +25.66). All areas show mild rejection of €60,000 (-4.08 to -12.95) and strong rejection of €75,000 (-37.05 to -50.50).

Payload and cargo volume* indicates significant differences at the lowest payload level (<300 kg / 3 m³) in residential zones (p = .012, Holm-adjusted). **Operations in residential areas show the strongest rejection of the smallest van (-67.90)**, possibly due to higher density of stops and mixed goods. Despite this, medium-large (600-900 kg / 6-8 m³) and large vans (>900 kg / 8-10 m³) are preferred in all contexts, while the smallest van size is uniformly rejected. City-centre, urban-periphery, and residential contexts all prioritise the upper payload classes, and industrial and rural contexts display the same hierarchy, with even stronger rejection of the lowest level (industrial -77.43; rural -91.02).

Battery range* shows significant differences associated with rural delivery contexts at the shortest range (<100 km; $p < .004$, Holm-adjusted) **and the longest range** (>200 km; $p = .003$, Holm-adjusted). Operating in rural areas is associated with **the strongest rejection of <100 km (–91.02) and the strongest preference for >200 km (+65.02)**, reflecting higher autonomy requirements in low-density areas with longer routes and fewer charging stations. Respondents operating in city centres (+46.76), peripheral areas (+53.40), residential zones (+54.18), and industrial areas (+53.58) all strongly prefer >200 km and value 150–200 km ranges (utilities +32.57 to +38.81). Medium-short ranges (100-150 km) are mildly disliked across all areas (-1.33 to - 12.81), while <100 km ranges are strongly rejected everywhere (-73.34 to - 85.43).

The **multi-temperature zone* shows a statistically significant difference only for double-zone cooling in city centre areas** ($p = .028$, Holm-adjusted). **In these contexts, double-zone cooling is evaluated as neutral (+0.01)**, whereas all other areas clearly dislike it (utilities between -4.87 and -8.73). Across all delivery areas, the strongest and most consistent pattern is a clear preference for no cooling, with utilities highest in rural (+19.34), city periphery (+16.08), and residential zones (+13.83), and lower yet still positive in industrial (+5.23) and city-centre areas (+6.98). Single-zone and multi-zone cooling are consistently rejected across areas, although the strength of rejection varies residential and rural areas reject double-zone (-9.80; -8.73) and single-zone (–5.06; –6.46) most strongly, while city-periphery users show moderate rejection.

Energy management system does not reveal significant differences ($p \geq .05$). Across all delivery areas, standard driving is consistently and strongly rejected (utilities between -11.99 and -16.70). Eco-driving is the most widely preferred mode in urban periphery (+7.27), residential (+9.58), industrial (+14.12), and rural areas (+14.15). Smart driving is positively evaluated but at a lower level across all areas (utilities between +2.71 and +4.51). In city centre areas, smart driving is preferred (+7.76) and advanced eco-driving (+6.76) more strongly than eco driving (+2.18), possibly since city centre fleets face more stop-and-go traffic, energy constraints, and access rules. In contrast, in residential, industrial, and rural areas, advanced eco driving are less valued (-0.39 to -2.64), while basic eco driving appears to be sufficient outside dense areas.

For the **swap box*, significant differences across delivery areas appear for city-centre contexts at no swap box** (Holm-adjusted $p < .004$) **and the basic swap box** ($p = .003$), **for urban-periphery contexts at no swap box** ($p = .028$), and for **rural areas at the basic swap box** ($p = .028$). **City centre operations are associated with a preference for the basic swap box (+9.39)** over having none (-2.07), indicating that the swap box may facilitate transshipment with frequent stops or narrow kerbside space. In contrast, **urban periphery operations are associated with a preference for having a swap box (“no swap box” -5.44, with a positive evaluation of the mobile version (+7.49)** and only marginal acceptance of the basic one (+0.39). Residential-area contexts differ by strongly preferring no swap box (+8.11) and rejecting the basic configuration (-6.37), while showing neutral reactions toward mobile (-0.30) and smart swap boxes (-

1.44). Industrial areas tend toward having a swap box, particularly the basic version (+13.32) and, to a lesser degree, the mobile swap box (+3.61), while they clearly reject the smart foldable version (-12.72). Rural delivery contexts most strongly prefer no swap box (+12.78), reject both the basic (-10.81) and mobile swap boxes (-2.90), and view the smart swap box neutrally (+0.93).

3.2.7 Differences across countries (RQ1g)

This chapter answers **RQ1g:** ***"How do preferences and trade-offs differ between countries in Europe?"***. Preferences are analysed across countries based on respondents' reported country (or countries) of operation. The focus is on the Shift2Zero pilot countries, namely **Poland (N = 275)**, **Belgium (N = 96)**, **Norway (N = 43)**, **Greece (N = 21)**, and **Italy (N = 9),** which has a comparatively lower sample size. Additional countries, such as **Germany (N = 10)**, **France (N = 5)**, **the Netherlands (N = 4)**, **Spain (N = 4)** and **other countries (N = 3)**, were included in the HB estimation and reported descriptively, but excluded from post-hoc statistical inference due to limited subgroup sizes. Country of operation was captured as a multi-response variable; however, most respondents reported operating in a single country. Differences were assessed using the covariate-extended Hierarchical Bayes (HB) model, with post-hoc non-parametric tests applied where subgroup sizes allowed. Overall, the analysis remains sufficiently reliable because the larger country groups provide stable utility estimates and the non-parametric tests used are appropriate for unequal subgroup sizes (attributes that show significant differences are marked with "*").

Across countries, attribute importance (Figure 21) shows that battery range and payload or cargo volume are the priorities in all countries. Norway places the highest importance to battery range (23.9%) and payload (20.1%), price (15.1%) and cooling (14.4%). In Greece, by contrast, the emphasis is more on purchase price (23.4%) than range (17.8%) and payload (15.3%). In Poland, battery range clearly dominates (28.4%), followed by payload and volume (21.5%). Belgium shows more balanced preferences across battery range (24.9%) and payload (21.1%), price (15.5% and cooling (15.2%). In contrast, preferences in Italy focus on payload and cargo volume (24.0%), purchase price (16.6%) and battery range (15.3%), although results are interpreted cautiously due to the small sample size. Across the non-pilot countries, the Netherlands (24.4%), France (20.1%), and Germany (23.3%) all rank payload and cargo volume as most important attribute, followed by battery range (18.1%, 13.9%, 16.2%) and then purchase price (10.4%, 13.3%, 18.9%). In contrast, Spain (24.2%) and the "other countries" group (19.8%) prioritise battery range, with payload and cargo volume (23.9%; 17.4%) and purchase price (19.6%; 13.3%).

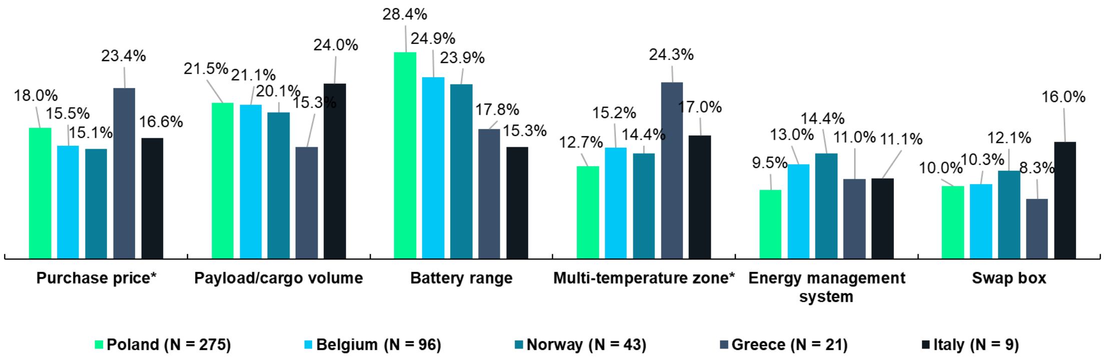

Figure 21. Average attribute importance (%), by country (pilot countries) (N = 457)

Purchase price* shows one statistical difference for Norway, due to the significant preference of the €60,000 option over the others (p ≈ 0.023, Holm-adjusted). **Operations in Norway differ from other countries, since they significantly accept the mid-high price of €60,000** (30.39), while the cheaper options receive only low acceptance (€30,000: 6.69; €45,000: -1.61) and the highest price is strongly rejected (-35.47). This reflects the more mature e-LCV market in Norway, where higher-priced vehicles with advanced specifications are more acceptable. In contrast, Greek delivery contexts show the strongest price sensitivity, with a strong preference for the €30,000 van (45.63) and rejection of higher prices, especially €75,000 (-52.51). Belgian delivery operations also favour cheaper vans (€30,000: 28.53; €45,000: 19.60) and strongly reject the most expensive option (€75,000: -43.84). Poland shows a similar pattern, nearly equally valuing the two lowest prices (€30,000: 25.96; €45,000: 22.15) and clearly rejecting €60,000 (-15.27) and €75,000 (-32.83). All non-pilot countries align with the general preference for the lowest price.

Payload and cargo volume does not show significant differences across countries (p ≥ .05). All countries clearly reject the smallest van (<300 kg / 3 m³) and clearly preferring larger configurations. Among Norwegian, Polish, and Greek operations, the preference is highest for the largest option (> 900 kg / 8-10 m³) (Norway: 41.36, Poland: 33.79, Greece: 41.97). In contrast, Belgium and Italy, show the highest preference for the medium-large van (600-900 kg / 6-8 m³) (Belgium: 38.50; Italy: 50.04; Poland: 23.00), suggesting that the largest vans may be impractical in more constrained road or urban environments. Across non-pilot countries, preferences also favour the medium-large van (e.g., NL 88.50; FR 74.87; DE 49.12; ES 48.87), while evaluations of the largest van vary more widely (e.g., DE 10.77; ES -38.03). Overall, medium-large vans appear to represent the most broadly suitable size class across markets.

Battery range does not show significant differences across countries (p ≥ .05). All countries strongly reject the shortest range below 100 km, with utilities ranging from –49.27 in Italy to -86.21 in Poland and generally dislike the 100-150 km option (e.g. Belgium -9.71; Greece -9.72; Germany -5.81; Poland -11.78). Preferences associated with operating in Norway and Poland show particularly strong support for the longest range (>200 km; Norway: 55.88; Poland: 58.70), while Belgium (46.26) and Greece (35.49 for 150-200 km) also show strong preferences for higher ranges. Italy displays a more balanced pattern, with positive utilities for both >200 km (24.91) and 150-200 km (16.67). Non-pilot countries follow similar patterns. Overall, preferences across countries indicate a shared expectation that e-LCVs should offer at least 150 km of range, and preferably over 200 km.

The **multi-temperature zone* show significant differences only for Greece, specifically for No cooling** (p = .016, Holm-adjusted) **and Double-zone cooling** (p = .015, Holm-adjusted). Preferences associated with operating in Greece strongly favour double-zone cooling (+63.02) and show low utilities for no cooling (-58.76), which likely reflects the high share of respondents operating in Greece who report working in cold-chain delivery (61.9%). Belgian delivery contexts show mixed preferences between no cooling (+12.24) and multi-zone cooling (+11.20). Norwegian delivery contexts favour no cooling (+21.02) and show moderate support for double-zone cooling (+7.23). Preferences in Italy favour single-zone cooling (+19.54) and moderately value double-zone cooling (+6.13), while no cooling (-16.22) and multi-zone cooling (-9.44) receive lower utilities. Polish delivery contexts favour no cooling (+23.98), show limited support for single-zone cooling (+5.97), and assign lower utilities to double- and multi-zone configurations. Across the non-pilot countries, patterns vary but remain non-significant: the Netherlands strongly prefer single-zone (+28.16), France prefer multi-zone (+35.94), Germany prefers no cooling (+32.82) and multi-zone (+19.80), while Spain strongly prefers double-zone cooling (+47.92) and rejects the others.

For **energy-management system**, preferences across countries do not differ significantly (all $p \geq .05$). Across all countries, advanced eco driving (e.g. Belgium +8.93; Greece +12.45) and eco driving (Italy +18.42; Poland +9.77) reflect the most preferred choice. Standard driving is widely rejected (e.g., Belgium -10.05; Poland -12.88), while smart driving shows mixed acceptance across countries (e.g., Norway +26.09 vs. Spain -23.55). The pilot countries differ from some non-pilot countries, where standard driving is still partly accepted (NL +38.97; FR +50.74), suggesting higher familiarity.

The **swap box** shows significant differences only for operations in Poland, where the mobile swap box receives lower utilities than for other countries (p = .048, Holm-adjusted). Poland is the only country where “no swap box” receives clear positive utility (+14.11), while the mobile swap box is strongly disliked (-11.05). Preferences in Belgium favour the mobile swap box (+20.59), while Italian and Norwegian contexts favour the basic swap box (Italy: +9.42, Norway +15.87). Similarly, preferences in non-pilot countries, such as France and the Netherlands, favour the basic swap box (FR +64.33; NL +71.91), while mobile and smart configurations receive lower utilities.

3.3 Latent class analysis (user segments) (objective 2)

A Latent Class Analysis (LCA) was conducted to identify distinct decision-making patterns among respondents. The selected **four-class model** shows behavioural user segments that differ in how they prioritise the e-LCV features. The LCA in this chapter aims to examine **RQ2 on what distinct user segments emerge in the sample based on preferences and trade-offs for e-LCV features**.

3.3.1 Overview of the latent user segments

The **latent class multinominal logit (LC-MNL) segmentation** is based on differences in part-worth utilities (i.e., attribute-level preferences), and the attribute importance scores summarise these differences in this chapter. The four latent user segments, presented in Figure 22, include: **(1) cargo-capacity-oriented users, (2) innovation-oriented users, (3) price-oriented users,** and **(4) range-oriented users**.

The first segment of **cargo-capacity-oriented users** (payload weight and volume) accounts for 28.4% of the sample. They clearly prioritise payload and cargo volume (50.4%), followed by a secondary interest in battery range (30.3%) and to a lesser extent purchase price (15.4%).

The second segment of **innovation-oriented users** represents 28.9% of the sample and is characterised by a strong focus on multi-temperature zones (24.2%) and energy-management support (24.9%). These users also give some importance to battery range (18.2%) and payload and cargo volume (14.6%), while purchase price (8.6%) and swap box (9.5%) are less relevant.

The third segment of **price-oriented users**, making up 19.2% of the sample, places the largest emphasis on purchase price (43.9%), clearly prioritising affordability over other attributes. They also assign comparatively high importance to battery range (14.0%) and multi-temperature zones (25.7%) relative to the CBC results. This may suggest that price-oriented users value multi-temperature cooling to support flexible use across different delivery tasks and reduce reliance on multiple specialised vehicles.

The last segment of **range-oriented users**, comprising 23.5% of the sample, strongly prioritises battery range (59.6%), more than any other attribute. They only slightly value the remaining features, with multi-temperature zones (12.7%) and payload and cargo volume (11.3%) but all other attributes are less important.

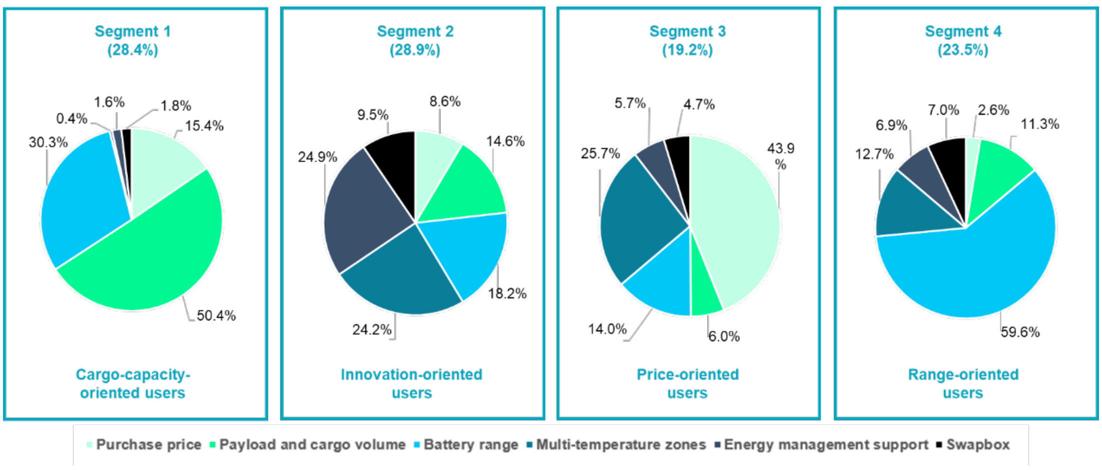

Figure 22. Average attribute importance (%) of each latent user segment (N = 457)

3.3.2 Preference structure of the latent user segments

To gain a better understanding of the underlying drivers of the decision-making factors in each segment, the part-worth utilities for each attribute level were compared across the segments. This analysis shows which attributes matter most to each segment and how specific preferences for attribute levels differentiate.

Purchase price: Price sensitivity is highest among the price-oriented users (Segment 3), who strongly prefer the low-price options (€30,000 and €45,000) and clearly reject higher prices (Figure 23). Cargo-capacity-oriented users (Segment 1) remain price-sensitive but are willing to pay more (e.g. €45,000) when higher capacity or battery range is offered. Innovation-oriented users (Segment 2) accept medium to high prices (€45,000-€60,000) when linked to advanced technological features. Range-oriented users (Segment 4) are comparatively indifferent to price variation and show slight rejection of €60,000.

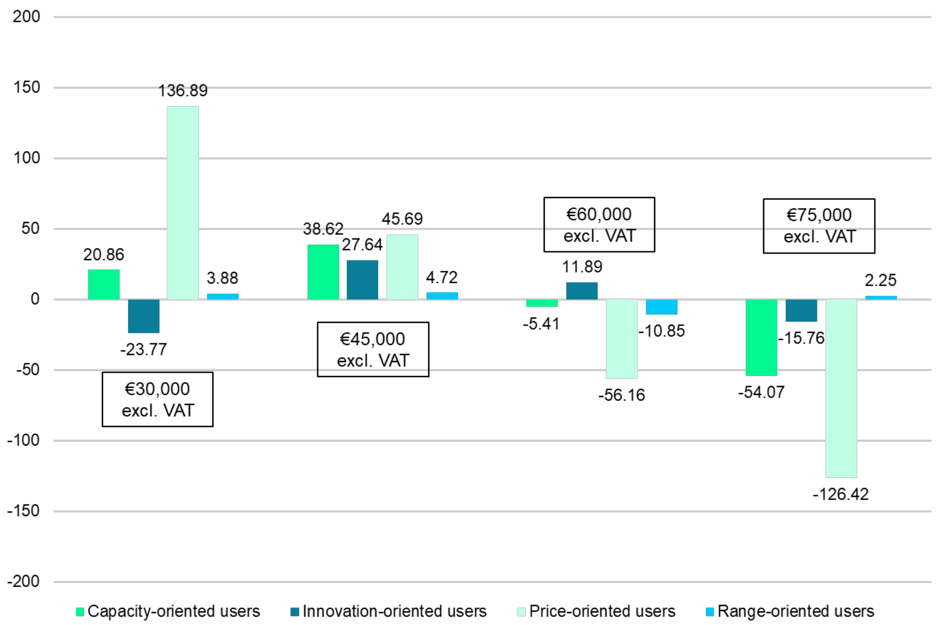

Figure 23. Part-worth utilities latent user segments – purchase price (N = 457)

Payload and cargo volume: Preferences are most dispersed for the capacity attribute. Cargo-capacity-oriented users (Segment 1) clearly prefer high-capacity vans (600-900 kg and >900 kg) and clearly reject small payloads (Figure 24). Innovation-oriented users (Segment 2) prefer the smallest (<300 kg) and medium-large (600-900 kg) configurations. Price-oriented users (Segment 3) prefer medium (300-600 kg) and large (>900 kg) capacities and show no interest in very small payloads. Range-oriented users (Segment 4) reject small payloads (<300 kg) but prefer medium-large over very large capacities, reflecting a balance between usable payload and range efficiency.

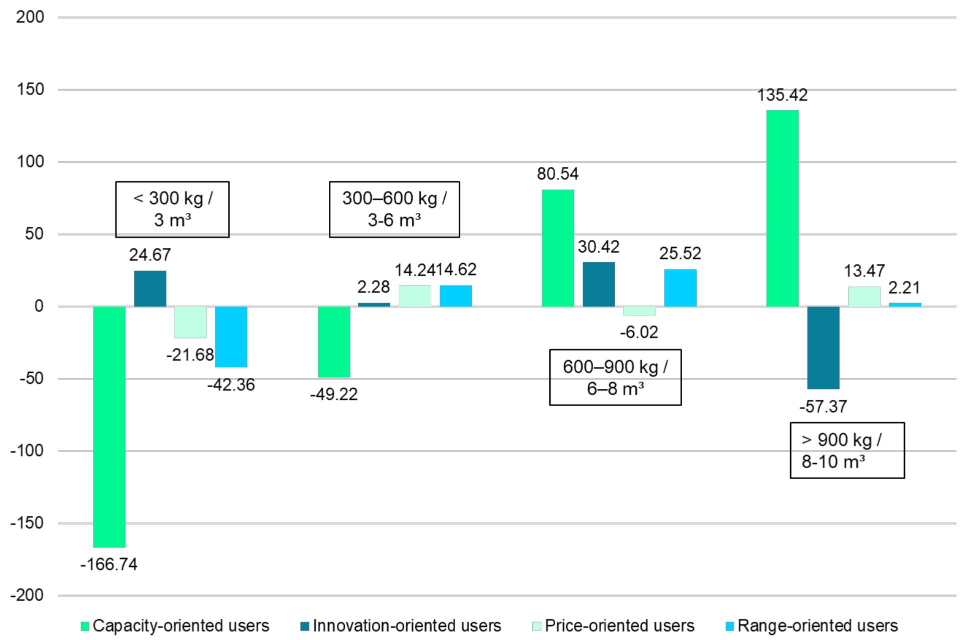

Figure 24. Part-worth utilities latent user segments – payload and cargo volume (N = 457)

Battery range. Battery range is the most important feature for the range-oriented users (Segment 4), who strongly prioritise >200 km and reject short ranges (Figure 25). Cargo-capacity-oriented users (Segment 1) also reject short ranges but are more evenly split between 150-200 km and >200 km. Innovation-oriented users (Segment 2) clearly prefer mid-range batteries (150-200 km), suggesting that range matters but remains secondary to technological features. Price-oriented users (Segment 3) prefer moderate ranges (100-150 km), consistent with a trade-off between cost and performance.

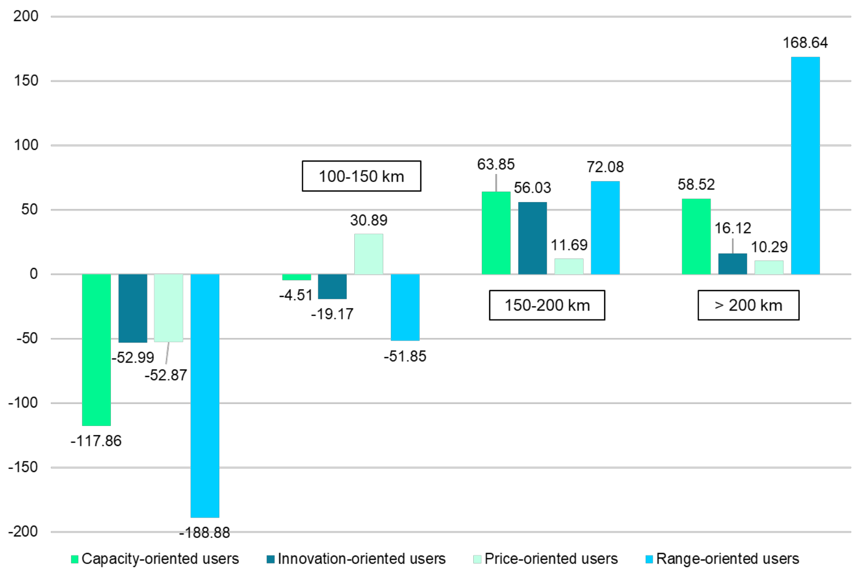

Figure 25. Part-worth utilities latent user segments – battery range (N = 457)

Multi-temperature zones: The multi-temperature zones are strongly valued by the innovation-oriented users (Segment 2), who clearly prefer both double-zone and multi-zone cooling (Figure 26). By contrast, price-oriented users (Segment 3) and range-oriented users (Segment 4) both prefer no cooling and reject double- and multi-zone options, indicating reluctance to trade cost or range for additional cooling capabilities. Cargo-capacity-oriented users (Segment 1) show near-indifference toward cooling, suggesting that it plays a less important role than payload and volume.

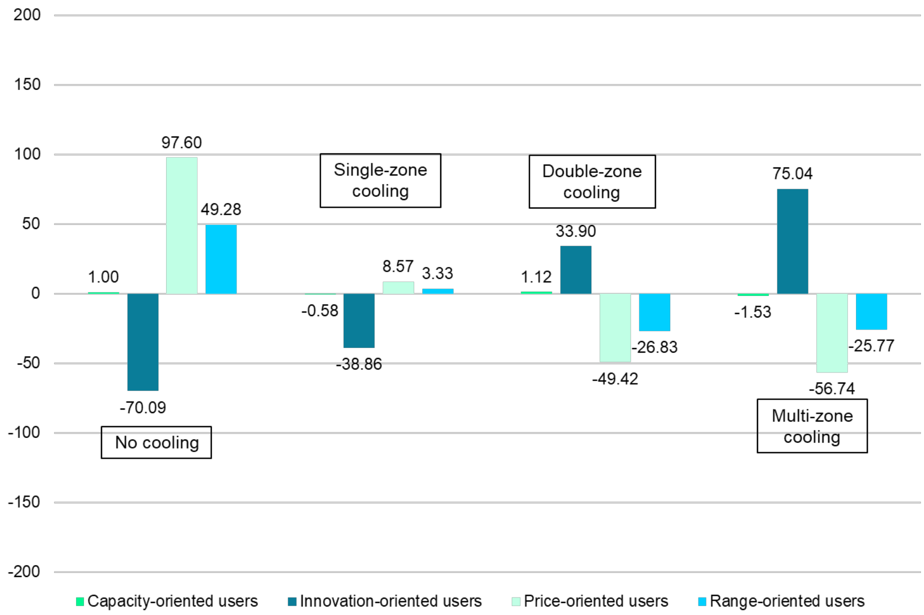

Figure 26. Part-worth utilities latent user segments – multi-temperature zone (N = 457)

Energy-management system: Advanced energy management systems are most appreciated by the innovation-oriented users (Segment 2), who clearly prefer advanced eco driving and reject standard driving (Figure 27). Price-oriented users (Segment 3) reject standard and advanced eco driving but value smart driving, indicating interest only in features that offer clearly visible benefits. Range-oriented users (Segment 4) prefer regular and slightly advanced eco driving but reject smart driving, likely due to perceived complexity or energy trade-offs. Cargo-capacity-oriented users (Segment 1) are broadly indifferent to energy-management support.

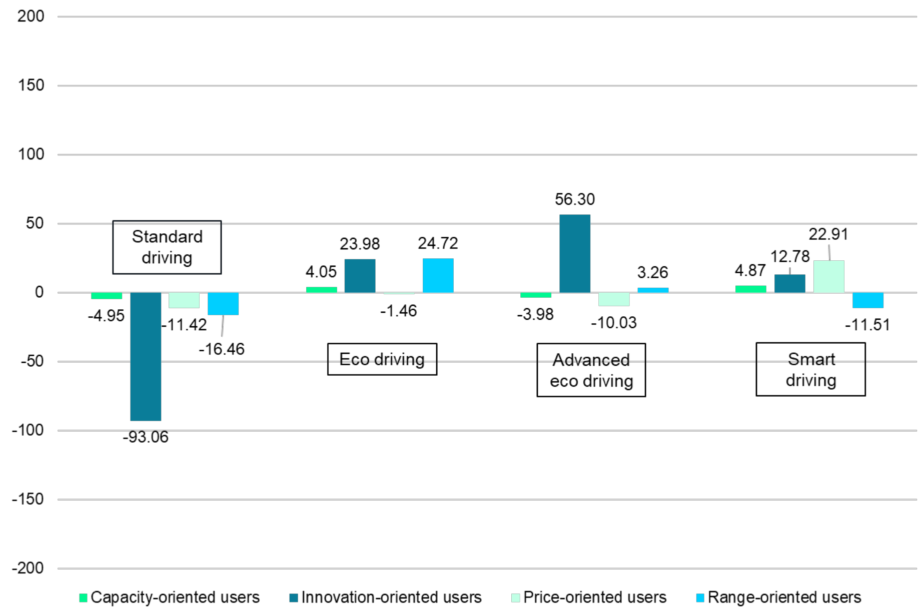

Figure 27. Part-worth utilities latent user segments – energy-management system (N = 457)

Swap box system: Innovation-oriented users (Segment 2) value basic and mobile swap boxes but reject the smart foldable version, suggesting they are still selective in avoiding costly innovations (Figure 28). Price-oriented users (Segment 3) prefer basic and smart swap boxes, but do not value the mobile swap box, indicating they only pay more for clear smart innovations. Range-oriented users (Segment 4) prefer no swap box, show small acceptance of mobile swap boxes, and reject basic and smart variants, possibly due to added weight or complexity. Cargo-capacity-oriented users (Segment 1) show remain largely indifferent and prioritise capacity over innovations.

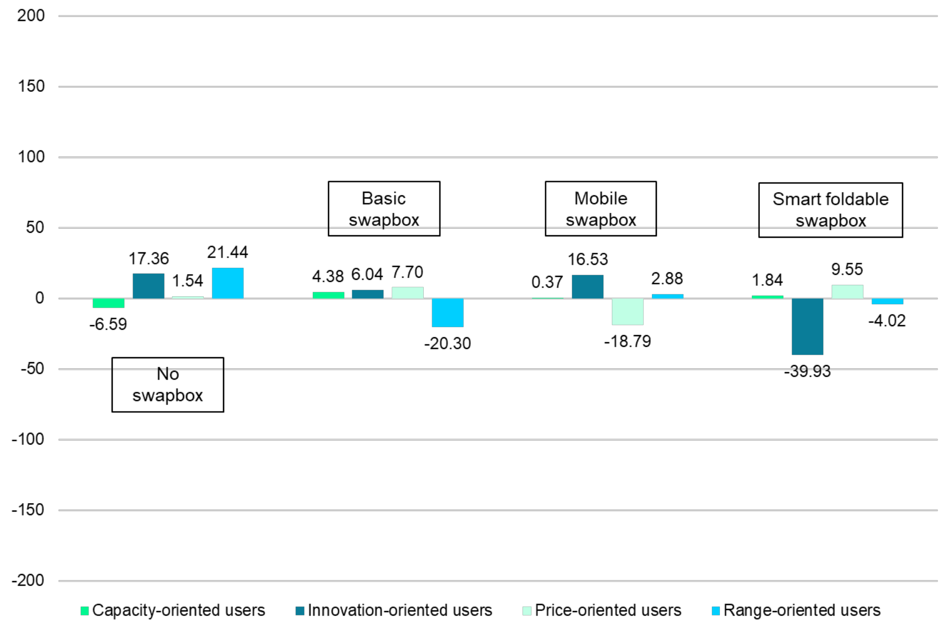

Figure 28. Part-worth utilities latent user segments – swap box (N = 457)

The Kruskal–Wallis test confirmed significant overall differences in utilities across the four latent classes ($p < .001$). Follow-up Mann–Whitney tests showed that all pairwise comparisons were statistically significant (all $p < .001$), demonstrating that each segment applies a distinct pattern of attribute valuation. Together, these results validate the relevance of the four-class segmentation in explaining heterogeneity in e-LCV preferences.

3.3.3 Profile characteristics of the latent user segments

To understand which types of users are represented within each of the four preference-based segments, the latent user segments were profiled across several co-variates, namely **user role, experience level, vehicle type, delivery type, delivery area, and country** (co-variates from the previous HB model). Chi-square tests were used to assess whether the distribution of users across segments differed significantly from the total sample (attributes that show significant differences are marked with "*"). These results also explain why each segment shows the specific preference patterns reported in sections 3.3.1 and 3.3.2. An overview table of the profile characteristics of each latent user segment is provided in chapter 6.5 (Annex 5).

User role* shows **statistically significant variation** between segments (χ^2, $p = .045$). **Cargo-capacity-oriented users (Segment 1) include a disproportionately high share of national fleet managers** (3.6% vs. 1.8% in the total sample), whereas employed drivers (39.4% vs. 44.7%) and branch or depot managers (8.8% vs. 12.7%) are slightly underrepresented. This may align with their focus on payload and cargo volume, as national fleet managers often oversee consolidated operations. In contrast, **innovation-oriented users (Segment 2) contain a much larger share of respondents classified under "other roles"** (17.6% vs. 12.7%), while national fleet managers are absent from this segment. This supports the segment's emphasis on advanced features, as these respondents likely work in specialised or emerging operational niches. Price-oriented users (Segment 3) show the opposite pattern**, with "other roles" underrepresented** (9.9% vs. 12.7%) and slightly more local fleet managers (8.8% vs. 6.4%), though this difference is not statistically significant**. Range-oriented users (Segment 4) also display an underrepresentation of "other roles"** (3.8% vs. 12.7%) and a higher share of employed drivers (50.0%). The latter is consistent with their strong preference for long battery range, which is crucial for drivers covering long daily distances.

Experience level, by contrast, does not differ significantly across the latent classes (χ^2, $p = .408$). Cargo-capacity-oriented users (Segment 1) include slightly fewer respondents with 1-2 years of experience (6.6% vs. 11.3%) and somewhat more with 6–10 years (23.4% vs. 22.1%) or 11–15 years (15.3% vs. 11.9%). Innovation-oriented users (Segment 2) show a somewhat higher share of respondents with less than one year of experience (9.6% vs. 6.6%) and 1-2 years (16.0% vs. 11.3%), but fewer with more than 11 years of experience. Price-oriented users (Segment 3) include fewer inexperienced respondents (3.3% vs. 6.6%) and fewer respondents with 3-5 years (16.5% vs. 22.5%), while more than 11-15 years (14.3% vs. 11.9%) and more than 15 years of experience (29.7% vs. 25.6%) are slightly more common. Range-oriented users (Segment 4) also include somewhat more users with 6–10 years (24.0%) and 11-15 years (14.4%) of experience. This suggest that professionals that are newer to logistics may be more open to new innovations, while more experienced users are more familiar with or reply more on basic operational features.

Vehicle type likewise does not significantly differentiate the segments (χ^2, $p = .276$). Cargo-capacity-oriented users (Segment 1) rely predominantly on diesel vans (67.2% vs. 55.9%), which may reflect the greater ability of diesel vehicles to offer both high payload capacity and long range without being constrained by battery weight. Innovation-oriented users (Segment 2) report the highest share of electric van use (43.2% vs. 33.4%), despite the trade-offs electric vans face between battery size, payload capacity, and range. Price-oriented users (Segment 3) again show an overrepresentation of diesel vans (63.7%). Range-oriented users (Segment 4) display a balanced distribution between diesel vans (62.5%) and electric vans (36.5%), which might signal the importance of autonomy for any vehicle type, even though the underlying constraints differ between diesel and electric vehicles.

Delivery type* shows **several statistical differences**. **Postal and parcel delivery differs significantly ($p = .004$), with a very high share of users in this category among range-oriented users** (Segment 4: 97.1% vs. 83.4%) and, to a lesser extent, cargo-capacity-oriented users (Segment 1: 86.1%). **Grocery and food delivery also varies significantly ($p = .018$), with slightly more capacity-oriented (21.9%) and innovation-oriented users (21.0%) involved in these operations**, while price-oriented users (Segment 3) appear noticeably less involved (11.0%). Although other delivery types do not differ significantly, innovation-oriented users show somewhat higher participation in pharmaceutical and medical deliveries (20.2% vs. 18.9%).

Delivery area* shows **several statistical differences** as well. **Cargo-capacity-oriented users (Segment 1) are more frequently active in city centres (67.9% vs. 62.9%; $p = .001$) and urban peripheries (54.0% vs. 48.8%; $p = .003$).** This is because urban deliveries with a high density of stops and mixed-goods operations may require larger capacity. **Price-oriented users (Segment 3) are also overrepresented in urban peripheries (57.1%)**. In contrast, innovation-oriented users (Segment 2) are less active in urban peripheries and residential areas compared to the total sample. **Range-oriented users (Segment 4) stand out with a high share operating in rural areas (65.4% vs. 50.2%; $p = .002$)**, while their presence in city centres (44.2%) falls well below the total sample. This shows that users with strong range requirements tend to operate in rural areas, while cargo-capacity-oriented and price-oriented users remain concentrated in more urban zones.

Finally, **country** does not significantly differentiate the segments (all $p \geq .05$). Cargo-capacity-oriented users (Segment 1) include slightly more respondents from Belgium (21.9% vs. 20.7%) and Norway (13.1% vs. 9.6%), while Poland remains strongly represented (59.1% vs. 56.3%). Innovation-oriented users (Segment 2) closely mirror the overall sample distribution, with Poland (57.7%) and Belgium (19.5%) dominant. Price-oriented users (Segment 3) show slightly higher shares from Germany (4.4% vs. 2.7%) and Italy (3.3% vs. 2.1%). Range-oriented users (Segment 4) contain the highest proportion of Polish respondents (68.3%), while other countries align with the full sample.

3.4 Market simulation (objective 3)

The third research objective aims at integrating the part-worth utilities from the HB analysis into share of preference market simulations. It addresses **RQ3: What is the simulated share of preference for different e-LCV innovations?**

The goal of this analysis is to estimate the share of preference for each innovation level within advanced vehicle configurations, compared to a current baseline vehicle without additional innovations (see chapter 2.4.3), and to examine how these shares change with varying purchase prices of the advanced vehicles. The baseline vehicle represents current standard e-LCVs available on the market today, while the advanced configurations, especially the higher levels (level 3 and 4), reflect near-future innovations that are currently under development within the project.

The analysis is particularly relevant because the **Shift2Zero KPIs** state that innovative e-LCVs should not exceed 20-25% higher e-LCV acquisition cost than today's basic electric models, implying a **target purchase range of €75,000-85,000**. The detailed results of the market simulation for the multi-temperature zone, energy management system, and swap box innovations are shown in chapter 6.6 (Annex 6).

Multi-temperature zone

Across all price levels, the **advanced multi-temperature zone configurations** (see chapter 2.4.3) attract **lower share of preference** than the baseline vehicle. At the initial price point of €30,000, the baseline vehicle reaches a preference share of 35.7%, while the multi-temperature zone variants achieve 22.6% for single-zone cooling (level 2), 21.2% for double-zone cooling (level 3), and 20.5% for multi-zone cooling (level 4). This may be since the market simulation is based on the full sample to ensure comparability across all innovations, and therefore includes respondents without cooling needs, who may be more likely to select the cheaper baseline vehicle.

Across the higher simulated price points (€45,000 - €75,000), the baseline maintains or slightly increases its share between 35% and 40%, while all multi-temperature variants are below the shares of the baseline vehicle. The preference share for single-zone cooling fluctuates between 13% and 24%, double-zone cooling between 17% and 23%, and multi-zone cooling between 14% and 22%, depending on the price. The variation of the share of preference across the multi-temperature zone levels may suggest that different cooling configurations appeal to different operational needs. These findings are consistent with the CBC results, which showed that multi-temperature cooling is particularly valued by specialised user groups such as food, grocery, and medical deliveries. This may imply a development and scaling strategy centred on use-case-specific vehicle configurations and targeted pilot deployments as foreseen. In addition, as the benefits of multi-temperature cooling depend on the operational context and user familiarity, the results highlight the importance of communicating the functionality and benefits of the innovations during the market deployment phase (WP8).

Energy management system

In contrast, the **advanced energy management vehicles (see chapter 2.4.3) consistently show higher share of preference** than the baseline vehicle across the entire price range. At the lowest price point (€30,000), the baseline vehicle with only standard driving receives 18.5% of preference, while smart driving as the broadest market segment (level 4) reaches 28.2%. Eco driving (level 2) achieves 27.3%, and advanced eco driving (level 3) reaches 26.0%.

As prices increase, the advanced energy-management variants remain preferred at all price levels. Between €45,000 and €75,000, eco driving has a share between 16% and 32%, advanced eco driving remains between 15% and 30%, and smart driving varies between 15% and 33%. When the price of one energy-management level increases, its preference shares decline, but the lost share is largely redistributed to the other advanced vehicles rather than to the baseline. This indicates that users prefer energy management features over standard driving modes, even at higher purchase prices.

A possible reason for the strong preference, especially for smart driving, may be that users are already familiar with basic eco-driving features, making more advanced configurations easier to evaluate. Therefore, the added value might have been immediately apparent to respondents in the survey without requiring any technical understanding of the innovation. In addition, the energy management system may provide a direct and immediate operational benefit, as they extend battery range, reduce energy costs, and help drivers manage operational constraints such as dense traffic, long routes, and limited charging availability.

Swap box

Similar to the multi-temperature zone, the advanced swap box configurations (see chapter 2.4.3) maintained lower preference shares than the baseline vehicle across all price levels. At €30,000, the baseline vehicle reaches 28.6% share of preference, whereas the swap box variants achieve 24.9%, 23.9%, and 22.6%, respectively. As prices rise from €45,000 to €75,000, the baseline remains relatively stable or slightly increases its share between 28% and 32%.

The advanced swap box vehicles remain consistently below the baseline but show stable preference ranges across the prices range. The basic swap box (level 2) varies between 13% and 29%, the mobile swap box (level 3) between 14% and 27%, and the smart foldable swap box (level 4) between 13% and 26%, depending on the price level. These results may be since swap boxes support more specific operational situations, such as city-centre deliveries, industrial environments, or high-turnover loading contexts. The perceived value of swap-box solutions appears to depend on the logistics system such as compatible infrastructure, available space, and adapted workflows, which vary across user’s contexts. Accordingly, the results indicate that swap-box solutions may be most effectively assessed in use-case-specific settings, with clear communication of the technical benefits and the logistics system requirements.

4. Conclusion

This deliverable D2.3 provides a quantitative view of how logistics users evaluate electric light commercial vehicle (e-LCV) features linked to the Shift2Zero innovations. By applying a choice-based conjoint (CBC) survey with 457 selected respondents, the study complements qualitative insights gathered in the previous tasks of WP2 (T2.1, T2.2) on the vehicle, fleet, and system level.

4.1 Conclusion choice-based conjoint analysis (objective 1)

Objective 1 addresses *RQ1a-g: How do logistics users in Europe express preferences and make trade-offs between basic and innovative e-LCV features (in general across user role / experience level / vehicle type / delivery type / delivery area / countries)*?

The CBC results show that users particularly value innovations when they **support operational reliability, battery range, and cost-efficiency**. In practical terms, the user value is highest when the total purchase price of the e-LCV remains **below approximately €45,000 excl. VAT**. Purchase prices up to €75,000 excl. VAT, based on the Shift2Zero thresholds, were tested, and the results indicate that users are willing to pay moderately higher prices in specific cases with operational value, such as for double- and multi-temperature zone or advanced and eco-driving systems.

Furthermore, the innovations add most value when targeted to **mission-specific applications** and **aligned with technical and economic conditions**. Multi-temperature zone features are most relevant for cold-chain, grocery, and medical deliveries and are preferred particularly when combined with sufficient driving range and moderate vehicle prices. This may indicate that multi-temperature cooling is mission-critical for specific sectors and could most efficiently be tested within these contexts. Energy-management systems are most appreciated by electric-van users, especially in mature electric vehicle markets such as Norway, and in medium-sized vehicles commonly used in urban delivery. Swap boxes offer the greatest benefits in short- and medium-range city operations with frequent loading, unloading, and transshipment activities.

In line with these insights, the analysis found **significant differences across user roles, vehicle types, delivery segments, delivery areas and countries**. Diesel-van users tend to be more price-driven and focused on capacity, while electric-van users value innovations more such as advanced eco-driving support or mobile swap boxes more strongly. Drivers prioritise battery range because it directly affects their daily flexibility, whereas fleet, depot and branch managers put greater emphasis on payload and cargo volume, reflecting their responsibility for resource allocation. Preference structures also vary across delivery types, as parcel operators focus on battery range to ensure route completion, cold-chain and medical operators value advanced multi-temperature cooling, and rural users depend on higher battery range to cover larger distances.

In terms of country differences, Norwegian respondents appear more willing to accept higher purchase prices, likely reflecting a combination of supportive infrastructure, tax incentives, and the generally higher income and price levels in Norway compared to other countries. Greek users show a stronger focus on affordability, while Polish respondents place value on high payload. Belgian users tend to display a balanced but innovation-friendly profile.

Overall, these differences indicate that e-LCV adoption and innovation require differentiation by use case, role, and delivery context and suggest several implications. It may be relevant for OEMs to consider countries that are advanced in electrification as places to test e-LCV innovations, since the willingness to pay and understanding of the benefits are already present. In particular, the higher acceptance of mid-to-high price levels observed in Norway suggests that such markets may be particularly appropriate for early testing and demonstration of advanced e-LCV configurations. For policymakers, the results highlight the need to consider diverse operational user perspectives, especially drivers who are often underrepresented in user-centred research on e-LCV adoption, as well as different logistics sectors, when designing incentives and regulations for e-LCVs, as adoption varies by role, use case, and country.

4.2 Conclusion latent class analysis (objective 2)

Objective 2 answered *RQ2: Which distinct user segments emerge in the sample based on similar patterns of preferences and trade-offs?*

The Latent Class Analysis (LCA) identified **four distinct user groups** that differ in the importance they assign to the e-LCV attributes and in the preferences that determine their e-LCV use and adoption decisions. The four latent user segments include:

- **Cargo-capacity-oriented users** prioritise large payload and cargo volume and show willingness to accept higher prices when these requirements are met. This segment is closely linked to dense urban and mixed-goods operations, where the vehicle capacity is critical for the delivery operations.
- **Innovation-oriented users** value advanced innovations such as multi-temperature zones and energy-management systems, typically operating in specialised fields, including medical, food, and electric van fleets.
- **Price-oriented users** prefer low-cost vehicles and are price-sensitive towards advanced innovations and features.
- **Range-oriented users** prioritise battery range, reflecting the needs of users working in rural, long-distance, or route-intensive networks.

The user segments align with **context-specific preferences** that translate into **vehicle needs** and highlight the need to offer mission-specific e-LCVs. Cargo-capacity-oriented users, which are common in high-density urban and mixed-parcel operations, require large-capacity e-LCVs. Range-oriented users, who operate more frequently in rural or long-distance contexts, need long-range models with reliable battery range. Innovation-oriented users, active in specialised or temperature-sensitive niches, benefit most from advanced innovation levels such as double- or multi-temperature cooling; advanced or smart energy-management; and mobile swap box. Price-oriented users, dominant in cost-sensitive and suburban delivery contexts, depend on affordable e-LCV models. From an application perspective, the latent class segmentation supports the development of modular and configurable e-LCV platforms that allow innovations to be selectively combined to improve applicability, scalability, and replicability across different logistics contexts.

4.3 Conclusion market simulation (objective 3)

Objective 3 examined *RQ3: What is the simulated share of preference for different e-LCV innovations?* The simulations compared **nine advanced vehicle configurations**, each characterised by exactly one innovation level, with higher levels reflecting the future innovations under development in the project. These were compared against a lower-priced baseline vehicle representing current standard e-LCVs without innovations.

The results show that the **energy-management system receives the highest preference shares** across all tested price levels. At every price point tested, the advanced configurations with eco, advanced eco, and smart driving, are chosen more often than the baseline vehicle. These results may indicate that users are more familiar with energy-management innovations than with the other tested innovations, as basic eco-driving modes are already established in many e-LCVs. This familiarity likely makes it easier for users to assess more advanced energy-management concepts across different price levels and use cases.

The **multi-temperature zone** and **swap box innovations** show a different result. At all price levels, their preference shares remain below those of the baseline vehicle, although each configuration shows a stable result. This may suggest that the multi-temperature zone and swap box are particularly valued by specialised user groups, and are currently less familiar across the full sample of respondents. The findings overall shows that innovations that rely more strongly on changes in logistics processes or system-level organisation, such as the multi-temperature zone and swap box, achieve lower utilities and shares of preference. That aligns with the previously identified complexity of implementation for rather system-dependent innovations (see D2.1), which may require process changes, or coordination beyond the vehicle level. In this context, clear communication of technical and functional benefits may help users better understand and evaluate such innovations during the testing and deployment within the project.

4.4 Limitations and outlook

This deliverable relies on a survey-based stated-preference conjoint approach, which enables systematic comparison of vehicle attributes but simplifies real-world decision-making and does not directly reflect observed adoption behaviour. Despite detailed descriptions, visual material, and workshops and interviews, respondents' familiarity with the analysed innovations may have varied, and potentially influence preferences, particularly for less familiar innovations such as the multi-temperature zone and swap box. The CBC design is an abstraction of the full interdependencies of e-LCV configurations, while some innovations may depend on the integration into the logistics system. In addition, some respondents were represented across multiple operating contexts (e.g. delivery types and areas) in the CBC analysis, therefore results were interpreted at the contextual rather than user-group level. Finally, market simulations are based on stated preference shares for e-LCV configurations with the individual innovation levels and do not reflect an actual market adoption. Together with the results from further WP2 deliverables, this deliverable will guide the next project steps by translating user needs and preferences into technical requirements, helping to target innovation development, pilot design, and testing in the specific pilot contexts.

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6. Annex

6.1 Survey questionnaire (Annex 1)

QLanguage: Choose Your Language / Wählen Sie Ihre Sprache / Kies jouw taal / Choisissez votre langue / Scegli la tua lingua / Επιλέξτε τη γλώσσα σας / Wybierz swój język / Elija su idioma
- QLanguage_1: English
- QLanguage_2: Deutsch
- QLanguage_3: Nederlands
- QLanguage_4: Français
- QLanguage_5: Italiano
- QLanguage_6: Ελληνική
- QLanguage_7: Polski

Survey Introduction: Shift2Zero Survey – Preferences on Electric Vans for Urban Logistics
Dear respondent,
thank you for participating in this survey. This survey is part of the European research project Shift2Zero, which aims to design innovative electric vans that better meet the needs of urban logistics. Your input will help us identify key vehicle features for daily logistics operations. The survey takes about 15 minutes. All answers will be kept anonymous and handled in compliance with GDPR. For questions, please contact Janin.Fauth@vub.be, Mobilise, Vrije Universiteit Brussel, Belgium.

Consent Survey Participation
You will find the informed consent statement in the following file: consent form.
- I give my consent to participate in this survey and to the processing of my personal data by the VUB researchers, in accordance with the European General Data Protection Regulation (GDPR).

Section 1: Your Work and Experience
Q1 - QRole: What is your role in your company? (Select one answer)
- QRole_1: Driver / courier (employee)
- QRole_2: Driver / courier (self-employed or subcontractor)
- QRole_3: Local fleet manager
- QRole_4: Regional fleet manager
- QRole_5: National fleet manager
- QRole_6: Branch or depot manager
- QRole_7: Other role *(please specify)*

Q2 - QVehicleType: What type of delivery vehicle do you primarily drive or manage in your job? (Select one answer)
- QVehicleType_1: Electric van (up to 3.5 tonnes, incl. electric vans with 4.25 tonnes exemption)
- QVehiceType_2: Diesel van (up to 3.5 tonnes)
- QVehicleType_3: Electric 3-4 wheeler (e.g. Paxster, quadricycle)
- QVehicleType_4: E-cargo bike
- QVehicleType_5: Cargo bike

- QVehicleType_6: Truck
- QVehicleType_7: Other *(please specify)*

Q3 - QElectricVan: Have you ever used, driven, or managed electric vans as part of your job now or in the past? If yes, how often? (Select one answer)
- QElectricVan_1: Yes, I use them daily or almost every day
- QElectricVan_2: Yes, I use them regularly (1–3 times/week)
- QElectricVan_3: Yes, I use them occasionally (1–3 times/month)
- QElectricVan_4: Yes, I have used them in the past
- QElectricVan_5: No, but I expect to use them in the future
- QElectricVan_6: No, I do not have any experience

Q4 - QVehicleOwnership: How are the delivery vehicles that you drive or manage for work primarily owned? (Select all that apply)
- QOwnership_1: The company I work for owns the vehicle(s)
- QOwnership_2: The company I work for leases the vehicle(s)
- QOwnership_3: A subcontractor or third-party company provides the vehicle(s)
- QOwnership_4: I own the vehicle(s) myself
- QOwnership_5: I lease or finance the vehicle(s) myself
- QOwnership_6: Other ownership type *(please specify)*
- QOwnership_7: I do not know

Q5 - QYourCompany: What type of company do you work for? (Select one answer)
- QCompany_1: Logistics service provider (e.g. DHL, DB Schenker, DPD)
- QCompany_2: Postal or parcel delivery service (e.g. BPost, La Poste)
- QCompany_3: E-commerce or retail company (e.g. Amazon, Colruyt, Carrefour)
- QCompany_4: Municipality or public operator (e.g. city waste collection, public utilities)
- QCompany_5: Subcontractor / owner-operator (e.g. self-employed courier, freelance driver)
- QCompany_6: Other company type *(please specify)*

Q6 - QYourCountry: In which country or countries do you primarily drive or manage delivery vehicles for your company? (Select all that apply)
- QCountry_1: Belgium
- QCountry_2: France
- QCountry_3: Germany
- QCountry_4: Greece
- QCountry_5: Italy
- QCountry_6: Netherlands
- QCountry_7: Norway
- QCountry_8: Poland
- QCountry_9: Spain
- QCountry_10: Other *(please specify)*

Q7 - QYourExperience: How long have you worked in logistics, delivery operations, or a similar field? (Select one answer)
- QExperience_1: Less than 1 year
- QExperience_2: 1–2 years
- QExperience_3: 3–5 years
- QExperience_4: 6–10 years
- QExperience_5: 11–15 years
- QExperience_6: More than 15 years

Q8 - QDeliveryType: What type of goods do you usually deliver in your company? (Select all that apply)
- QDelivery_1: Postal and parcel delivery
- QDelivery_2: Grocery or food delivery (non-refrigerated)
- QDelivery_3: Refrigerated or cold chain goods
- QDelivery_4: Pharmaceutical or medical goods

- QDelivery_5: Retail or e-commerce goods
- QDelivery_6: Other *(please specify)*

Q9 - QDeliveryArea: In what type of area do you typically carry out deliveries in your company? (Select all that apply)
- QArea_1: City center or dense urban areas
- QArea_2: Urban periphery or outer neighborhoods
- QArea_3: Suburban towns or residential areas
- QArea_4: Rural areas or countryside
- QArea_5: Industrial or logistics zones
- QArea_6: Other *(please specify)*

Q10 - QRegulatoryContext: Do any of the following regulations affect your deliveries? (Select all that apply)
- QReg_1: Low-emission zones – only low-emission vehicles allowed
- QReg_2: Zero-emission zones – only fully electric vehicles allowed
- QReg_3: Vehicle size or weight restrictions – e.g. max van size, truck bans
- QReg_4: Time-based access restrictions – e.g. deliveries only before 11 a.m.
- QReg_5: Noise or speed limits – e.g. quiet zones, 30 km/h limits
- QReg_6: We expect to be affected by such regulations in the future
- QReg_7: Other regulations *(please specify)*
- QReg_8: None of these

Note: Low-emission or restricted-access zones include areas where only certain vehicles are allowed — for example, based on emissions, weight, time of day, or noise level.

Section 2: Electric Van Features

This section **introduces key vehicle features** and asks a **few questions about your experience** with them. You will **then use this information to compare 3 electric van setups** and choose your preferred option afterwards.

Vehicle Feature 1: Purchase Price

The **purchase price in EUR excl. VAT** reflects different electric van models, from basic to advanced, based on features like battery size, cooling, energy systems, and swap boxes.

Option 1	Option 2	Option 3	Option 4
Purchase Price	**Purchase Price**	**Purchase Price**	**Purchase Price**
€30,000 **excl. VAT**	**€45,000** **excl. VAT**	**€60,000** **excl. VAT**	**€75,000** **excl. VAT**
Basic electric van without advanced features	**Standard electric van** with **basic** cooling, energy support, and swapbox	**Advanced electric van** with **advanced** cooling, energy support, and swapbox	**Fully-equipped electric van** with advanced features in **real-time monitoring**

Note: Prices reflect typical European manufacturer rates. They may vary by country due to VAT, taxes, or subsidies. This feature helps understand trade-offs, even if not directly relevant to your role.

Q11 - QPurchasePrice: What is the purchase price of an electric van in your company (on average)? (Select one answer)
- QPurchasePrice_1: €30,000 excl. VAT
- QPurchasePrice_2: €45,000 excl. VAT
- QPurchasePrice_3: €60,000 excl. VAT
- QPurchasePrice_4: €75,000 excl. VAT
- QPurchasePrice_5: I do not know

Vehicle Feature 2: Payload & Cargo Volume
Maximum cargo capacity in **weight (kg)** and **volume (m³)**. Capacity varies by van size and equipment, for example, larger batteries or cooling systems may reduce payload.

Option 1	Option 2	Option 3	Option 4
Payload & Volume	**Payload & Volume**	**Payload & Volume**	**Payload & Volume**
< 300 kg / 3 m³	**300 - 600 kg / 3-6 m³**	**600 - 900 kg / 6–8 m³**	**> 900 kg / 8-10 m³**
Small van with **limited capacity**	**Standard van** with **moderate capacity,** cooling equipment may reduce available payload	**Large van** with **higher capacity** for general parcels and deliveries	**Extra large van with high capacity,** suitable for **heavy or high-volume** deliveries

Q12 - QPayloadVolume: What is the typical cargo capacity of the vans in your company (on average)? (Select one answer)
- QPayloadVolume_1: < 300 kg / 3 m³
- QPayloadVolume_2: 300–600 kg / 3–6 m³
- QPayloadVolume_3: 600–900 kg / 6–8 m³
- QPayloadVolume_4: > 900 kg / 8–10 m³
- QPayloadVolume_5: I do not know

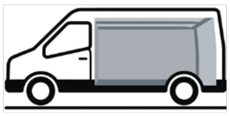
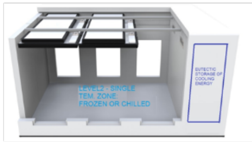
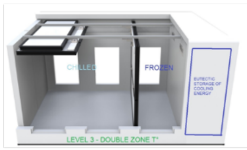
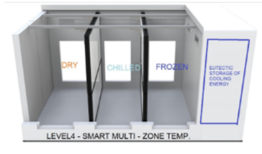
Q13 - QPayloadPriority: Which type of capacity is typically more important for your work, payload weight (kg) or cargo volume (m³)? (Select one answer)
- QPayloadPriority_1: Payload (kg)
- QPayloadPriority_2: Cargo volume (m³)
- QPayloadPriority_3: Both equally
- QPayloadPriority_4: I do not know

Vehicle Feature 3: Battery Range
Maximum driving distance (km) on a **full battery** under **typical delivery conditions**. Range depends on battery size, vehicle weight, energy use, and delivery conditions.

Option 1	Option 2	Option 3	Option 4
Battery Range	**Battery Range**	**Battery Range**	**Battery Range**
< 100 km	**100 - 150 km**	**150 - 200 km**	**> 200 km**
Small battery for limited urban deliveries	**Mid-size battery** for city and nearby urban routes	**Larger battery** for longer daily or regional deliveries	**Extra-larger battery** with efficient energy use for extended deliveries

Q14 - QBatteryRange: What is the battery range of a van in your company (on average)? (Select one answer)
- QBatteryRange_1: < 100 km
- QBatteryRange_2: 100–150 km
- QBatteryRange_3: 150–200 km
- QBatteryRange_4: > 200 km
- QBatteryRange_5: The company does not own any electric van
- QBatteryRange_6: I do not know

Vehicle Feature 4: Multi-Temperature Zones
Temperature-controlled cargo body with **up to 3 zones (frozen, chilled, ambient)**, using **adjustable, foldable** partitions. **Eutectic materials** maintain temperature without drawing power from the vehicle.

Option 1	Option 2	Option 3	Option 4
No Cooling	**Single-Zone Cooling**	**Double-Zone Cooling**	**Multi-Zone Cooling**
			
Standard cargo area **without temperature control**	**1 single temperature zone** (e.g. frozen OR chilled), all partitions are folded up	**2 separate temperature zones** (e.g. frozen + chilled), one partition is in use, one is folded up	**3 separate temperature zones** (frozen, chilled, and ambient), all partitions are in use

Q15 - QMultiTemperature: What kind of temperature-controlled cooling system have you used in a van in your company? (Select one answer)

- QMultiTemperature_1: No Cooling(standard cargo area without temperature control)
- QMultiTemperature_2: Single-Zone Cooling (1 single temperature zone, e.g. frozen OR chilled)
- QMultiTemperature_3: Double-Zone Cooling (2 separate temperature zones, e.g. frozen AND chilled)
- QMultiTemperature_4: Multi-Zone Cooling (3 separate temperature zones, e.g. frozen, chilled AND ambient)
- QMultiTemperature_5: I have used a different type of cooling system *(please specify)*
- QMultiTemperature_6: I am not involved in the delivery of temperature-controlled products

Vehicle Feature 5: Energy Management System
Energy management system that helps **save energy**, **increase range**, and **reduce wear on tyres and brakes** – from basic eco modes to advanced features like smart tyres, regenerative braking, and smart control systems.

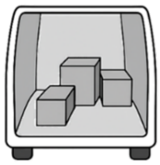
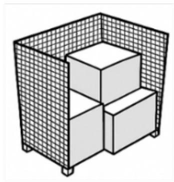
Option 1	Option 2	Option 3	Option 4
Standard Driving	**Eco Driving**	**Advanced Eco Driving**	**Smart Driving**
			
+0% driving range	**+5% driving range**	**+10% driving range**	**+15% driving range**
No energy-saving features	**Basic eco driving mode** that slightly reduces energy use	Includes **regenerative braking and tyres** to reduce energy use and tyre / brake wear	Fully **smart support adapting in real-time** to minimise energy use and tyre / brake wear

Q16 - QEnergySystem: What kind of energy management system have you used in a van in your company? (Select one answer)

- QEnergySystem_1: Standard Driving (no energy-saving features, +0% driving range)
- QEnergySystem_2: Eco Driving (basic eco mode, +5% driving range)
- QEnergySystem_3: Advanced Eco Driving (regenerative braking and tyres, +10% driving range)
- QEnergySystem_4: Smart Driving (smart and real-time adaptation to driving behaviour, +15% driving range)

- QEnergySystem_5: I have used a different type of energy-saving system *(please specify)*

Vehicle Feature 6: Swap box
A Swap box is a **movable container** placed in the cargo area to **simplify loading, unloading, and transshipment**. It may include wheels, a foldable frame, and tracking sensors (e.g. for temperature, movement, or humidity).

Option 1	Option 2	Option 3	Option 4
No Swapbox	**Basic Swapbox**	**Mobile Swapbox**	**Smart Foldable Swapbox**
			
No swapbox, goods are loaded directly in the cargo area	**Simple swapbox** without wheels, sensors, or special features	Swapbox **with wheels** and **data tracking sensor**	Swapbox **with wheels**, **data tracking sensor**, and **foldable** for return

Q17 - QSwap box: What kind of movable container system (used inside the van for loading, unloading, or transshipment) have you used in your company? (Select one answer)
- QSwap box_1: No Swap box (goods are loaded directly in the cargo area)
- QSwap box_2: Basic Swap box (swap box without wheels, sensors, or special features)
- QSwap box_3: Mobile Swap box (swap box with wheels and data tracking sensor)
- QSwap box_4: Smart Foldable Swap box (swap box with wheels, data tracking sensor, and foldable for return)
- QSwap box_5: I have used a different type of support system *(please specify)*

Choice Tasks – Let's Get Started
You will now see 8 choice tasks, each showing **3 electric van setups**. Please **choose the option you prefer** for your **professional use**.
📌 **Note: Some vehicle setups may not seem realistic — that is okay!** They are designed this way to understand your preferences.

Which of these 3 electric van options do you prefer for your professional use? (Select one option)
(8 choice tasks were shown, generated through the balanced overlap function in Sawtooth software)
💡 *You can review the meaning of each vehicle feature by hovering over the icons next to them:*
Purchase price excl. VAT*: The purchase price in EUR excl. VAT of the electric van with options including €30,000; €45,000; €60,000; €75,000.*
Payload and cargo volume: Maximum cargo capacity in payload weight (kg) and volume (m³), with options including < 300 kg / 3 m³; 300–600 kg / 3–6 m³; 600–900 kg / 6–8 m³; > 900 kg / 8–10 m³.
Battery range: Maximum driving distance (km) on a full battery under typical delivery conditions, with options including < 100 km; 100–150 km; 150–200 km; > 200 km.
Multi-temperature zone: Temperature-controlled cargo body with up to 3 zones (frozen, chilled, dry), using adjustable, foldable partitions. Options include No Cooling, Single-Zone Cooling, Double-Zone Cooling, Multi-Zone Cooling.
Energy management system: Energy management system that helps save energy, increase range, and reduce wear on tyres and brakes. Options include Standard Driving (+0% driving range), Eco Driving (+5% driving range), Advanced Eco Driving (+10% driving range), Smart Driving (+15% driving range).
Swap box: A Swap box is a movable container placed in the cargo area to simplify loading, unloading, and transshipment. Options include No Swap box, Basic Swap box, Mobile Swap box, and Smart Foldable Swap box.

Section 3: Final Questions

Q18 - QVehicleIssues: What are the biggest issues you face with delivery vehicles in your company? (Select all answers that apply)

- QVehicleIssues_1: High purchase price
- QVehicleIssues_2: Limited payload and cargo volume
- QVehicleIssues_3: Low battery range
- QVehicleIssues_4: Long charging time or limited access to charging points
- QVehicleIssues_5: Missing or inflexible multi-temperature zones
- QVehicleIssues_6: Insufficient driver heating or cooling
- QVehicleIssues_7: Missing system for loading and unloading goods
- QVehicleIssues_8: Inflexible cargo layout for transporting goods and passengers
- QVehicleIssues_9: Difficult access to zero-, low-emission, or restricted zones
- QVehicleIssues_10: Difficult parking in city areas
- QVehicleIssues_11: Limited safety features or lack of crash protection
- QVehicleIssues_12: Other challenges *(please specify)*

Q19 - QFeaturePreferences: How important are the following features when using a delivery vehicle? (Please drag and drop the items to rank them from most to least important)

- QFeaturePreferences_1: Purchase price
- QFeaturePreferences_2: Total cost over the lifespan of the van
- QFeaturePreferences_3: Battery range
- QFeaturePreferences_4: Payload and cargo volume
- QFeaturePreferences_5: Multi-temperature cargo zones
- QFeaturePreferences_6: Driver heating / cooling
- QFeaturePreferences_7: Swap box for loading and unloading
- QFeaturePreferences_8: Flexible cargo layout to transport goods and passengers
- QFeaturePreferences_9: Smart access features for speed control
- QFeaturePreferences_10: Smart access features for automatic parking reservation
- QFeaturePreferences_11: Other Features

Q20 - QVehicleInnovations: Have you ever used a delivery vehicle with any of the following innovations? (Select all answers that apply)

- QVehicleInnovations_1: Multi-temperature cargo system (e.g. separate frozen, chilled, and ambient zones)
- QVehicleInnovations_2: Energy management system (e.g. eco-driving, regenerative braking)
- QVehicleInnovations_3: Swap box system for easier loading/unloading inside the cargo area
- QVehicleInnovations_4: Infrared heating for the driver cabin
- QVehicleInnovations_5: Flexible cargo layout to carry goods or passengers
- QVehicleInnovations_6: Smart access features (e.g. automatic speed control, parking reservation)
- QVehicleInnovations_7: None of the above

You have reached the end of the survey - thank you for your participation!
Your input is very valuable and will directly support the development of electric vans that better address the real-world needs in urban logistics.
You will be able to **access the anonymized results** on the Shift2Zero Website.
Do you want to **stay updated** on the **latest innovations on electric vans**? Sign up for the Shift2Zero Newsletter.

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6.2 Informed consent form (Annex 2)

Informed Consent Form for the Shift2Zero Survey on Preferences for e-LCVs in Urban Logistics

You are invited to participate in the **research survey on "Preferences on Electric Vans for Urban Logistics",** conducted by the **Vrije Universiteit Brussel (VUB)** as part of the **Shift2Zero project** https://shift2zero-project.eu. The Shift2Zero project has been funded by the European Union's Horizon Europe research and innovation program under grant agreement no. 101192375. Your participation is entirely voluntary. You are under no obligation to participate, and if you decide not to participate, there will be no consequences for you. Take your time to decide whether you would like to take part. You may end your participation at any time without having to provide any reasons. Below, you will find further information about the study and how it will be conducted. If you need additional information, feel free to reach out to the contacts below (contact details were added).

1.Purpose of the study
This survey is conducted as part of the European project Shift2Zero https://shift2zero-project.eu**.** The Shift2Zero project has received funding from the European Union Horizon Europe Program, under grant agreement number 101192375.

The Shift2Zero project focuses on accelerating the adoption of zero-emission urban logistics vehicles by developing innovative electric light commercial vehicles (e-LCVs). It brings together vehicle manufacturers, logistics service providers, research organizations, and cities to co-create solutions that meet real-world logistics needs.

The survey collects inputs from users on the challenges and needs of using electric light commercial vehicles (e-LCVs) in urban logistics. This helps define user preferences and technical requirements to guide the design of innovative e-LCVs.

2.Participation
This survey is aimed at users of electric light commercial vehicles (e-LCVs), including drivers, fleet managers, branch managers, or similar roles within various types of companies involved in urban logistics.

3.Practical Implementation of the survey
Respondents will be invited via a research panel to complete this survey, which will take approximately 15 minutes. The first part includes questions about the respondent's role and experience in their current company (or in previous companies, if applicable), to provide context for their response. In the next part, respondents will be asked to compare different electric van setups in choice tasks, featuring various vehicle characteristics and select their preferred option from three alternatives. The final part consists of a few additional questions on their overall challenges and preferences to complete the respondent's profile and support the overall analysis.

4.Potential risks and disadvantages
There are no known risks associated with this study.

5.Potential benefits
This study will contribute to a better understanding of the challenges and needs of users of electric light commercial vehicles (e-LCVs) in their daily urban logistics operations and purchasing decisions. The findings will support the development of user preferences for the design of user- and mission-specific e-LCVs. These insights will inform the technical development of innovative e-LCVs, which will be developed, tested, and scaled to market within the project. After full anonymization, the results will be made available through the Shift2Zero project website to support various logistics stakeholders in shaping their fleet decisions.

6.Data protection and confidentiality

As researchers, we are obliged to **keep the collected data confidential**. This means that we commit never to disclose your name or any identifiable data in any publication or presentation. Individual results will never be published. We will collect and process personal data about/from you only for scientific research purposes and with your explicit consent.
Data collection and processing comply with the legal principles of the **EU General Data Protection Regulation (GDPR)**, in force since May 25, 2018. We – Janin Fauth, Prof. dr. Heleen Buldeo Rai, and Prof. dr. Koen Mommens – ensure the proper handling of your personal data and your associated information rights.
As part of the information rights, you should know:

a. The personal data collected from you includes: your role, company type, country, number of years of experience in logistics, type of vehicle in your company, diverse questions on your challenges and preferences using e-LCVs in a professional context in urban logistics.

b. The Vrije Universiteit Brussel (VUB), Pleinlaan 2, 1050 Brussels, KBO 449.012.406, is responsible for processing your data.

c. Your data will be used only for this study and stored only until the end of the project (June 2028), in accordance with applicable laws.

d. Your personal data will be used exclusively for scientific purposes.

e. You have the right to access and correct your data, as well as to request deletion, restrict processing, object to processing, and request data transfer to a third party. For questions, contact the researcher.

f. You may withdraw your consent at any time. This will not affect the legality of data processing that occurred before your withdrawal.

g. Your data will be accessed only by the researchers listed above and not shared with other institutions.

h. Your data will be securely stored in accordance with VUB guidelines.

i. If you have questions or want to exercise your rights, you can contact the VUB Data Protection Officer: dpo@vub.be.

j. To ensure your privacy, the following measures will be implemented:

- Initially, data will not be anonymous, but will be pseudonymized as soon as possible, creating a secondary dataset in which you can no longer be directly identified. A "translation key" will be created to link the codes back to their original meaning. Only the researchers (Janin Fauth, Prof. dr. Heleen Buldeo Rai, Prof. dr. Koen Mommens) will have access to this key. It will be stored securely and separately or deleted.
- Data will be stored only on VUB's SharePoint system, which has strict access control and high security standards. Data will never be stored on researchers' personal computers or USB sticks (unless encrypted) or sent via email.

k. You have the right to lodge a complaint about the handling of your data with the Belgian supervisory authority: Gegevensbeschermingsautoriteit (GBA); (contact details were added).

6.3 Overview sample composition (Annex 3)

Category	Subcategory	%	N
User role	Driver / courier (employee)	44.7	229
	Driver / courier (self-employed or subcontractor)	25.8	132
	Local fleet manager	6.4	33
	Regional fleet manager	0.4	2
	National fleet manager	1.8	9
	Branch or depot manager	12.7	65
	Other role	8.2	42
Main vehicle type	Electric van	33.4	171
	Diesel van	55.9	286
	Electric 3–4 wheeler (e.g. Paxster)	1.4	7
	E-cargo bike	2.1	11
	Cargo bike	0.8	4
	Truck	5.7	29

	Other vehicle type	0.8	4
Electric van experience	Daily / almost daily use	33.4	171
	Regular use (1–3x/week)	4.5	23
	Occasional use (1–3x/month)	4.9	25
	Past use	16.0	82
	Future use expected	8.2	42
	No experience	33.0	169
Vehicle ownership model	Company-owned	43.8	224
	Company-leased	33.4	171
	Provided by subcontractor	16.2	83
	Personally owned	14.6	75
	Personally leased/financed	10.0	51
	Other ownership type	0.2	1
	Unknown	3.1	16
Company type	Logistics service provider	70.9	363
	Postal or parcel delivery	17.0	87
	E-commerce / retail	3.3	17
	Municipality / public	0.8	4
	Subcontractor / owner-operator	6.2	32
	Other company type	1.8	9
Country	Belgium	20.7	106
	France	2.0	10
	Germany	2.7	14
	Greece	8.4	43
	Italy	2.7	14
	Netherlands	2.1	11
	Norway	9.6	49
	Poland	56.2	288
	Spain	1.2	6
	Other country	1.2	6
Logistics experience	< 1 year	6.6	34
	1–2 years	11.3	58
	3–5 years	22.5	115
	6–10 years	22.1	113
	11–15 years	11.9	61
	> 15 years	25.6	131
Delivery type	Postal & parcel	83.4	427
	Grocery & food	18.4	94
	Refrigerated / cold chain	13.7	70
	Pharmaceutical / medical	18.9	97
	Retail & e-commerce	24.6	126
	Other delivery type	5.7	29
Delivery area	City centre / dense urban	62.9	322
	Urban periphery	48.8	250
	Suburban / residential	48.8	250
	Rural / countryside	50.2	257
	Industrial / logistics zones	32.6	167
	Other delivery area	1.4	7
Regulatory context	Low-emission zones	19.7	101
	Zero-emission zones	9.2	47
	Size/weight restrictions	25.4	130

	Time-based access	32.2	165
	Noise/speed limits	23.4	120
	Expect future restrictions	12.7	65
	Other regulatory context	0.6	3
	None of the regulations	41.0	210
Vehicle issues	High purchase price	49.8	255
	Limited payload or volume	39.8	204
	Low battery range	53.3	273
	Long charging time or limited charging stations	33.0	169
	Difficult parking	30.1	154
	Insufficient driver heating/cooling	19.1	98
	Missing system for transshipment	13.9	71
	Inflexible cargo layout	7.8	40
	Difficult access to LEZ / ZEZ	7.4	38
	Limited safety / crash protection	8.0	41
	Other vehicle issues	5.1	26
Feature preferences	Purchase price	48.0	246
	Total cots over lifespan	12.3	63
	Battery range	23.2	119
	Payload and cargo volume	12.5	64
	Multi-temperature zones	0.8	4
	Driver heating and cooling	0.8	4
	Swap box for transshipment	0.4	2
	Dual transport cargo area	0.8	4
	Geofencing feature (speed control)	0.6	3
	Geofencing feature (automatic parking)	0.6	3
Innovation experience	Multi-temperature zones	13.3	68
	Energy management system	33.2	170
	Swap box system	7.6	39
	Infrared heating driver cabin	2.9	15
	Dual transport cargo area	7.6	39
	Geofencing features	11.5	59
	None of the innovations	52.9	271

6.4 Part-worth utilities (most and least preferred levels) and standard deviation for the full sample, by user role, by experience level, by vehicle type, by delivery type, by delivery area, and by country (Annex 4)

6.4.1 Part-worth utilities and standard deviation – full sample (RQ1a)

Attributes	Attribute levels	Average utilities	Standard deviation
Purchase price	**€30,000 excl. VAT**	**28.48715**	44.12584
	€45,000 excl. VAT	22.29630	30.94743
	€60,000 excl. VAT	-10.29328	30.69409
	€75,000 excl. VAT	**-40.49017**	48.38506
Payload & cargo volume	**< 300 kg / 3 m³**	**-52.85235**	58.22995
	300–600 kg / 3-6 m³	-8.10039	33.61804
	600–900 kg / 6–8 m³	29.28690	30.13902
	> 900 kg / 8-10 m³	**31.66584**	57.68079
Battery range	**< 100 km**	**-79.87179**	48.2291
	100–150 km	-13.09335	31.82602
	150–200 km	37.97668	31.85265
	> 200 km	**54.98846**	55.40936
Multi-temperature zones	**No cooling**	**14.95256**	46.19757
	Single-zone cooling	-2.80002	28.29407
	Double-zone cooling	**-6.81729**	32.97996
	Multi-zone cooling	-5.33525	29.16453
Energy management support	**Standard driving**	**-16.96066**	25.10988
	Eco driving	**7.61415**	19.59667
	Advanced eco driving	3.32953	23.68557
	Smart driving	6.01698	24.82609
Swapbox	**No swapbox**	**6.14172**	29.69873
	Basic swapbox	-0.92509	25.12387
	Mobile swapbox	-1.21580	20.90482
	Smart foldable swapbox	**-4.00083**	22.40509

Most preferred option (highest average utilities), least preferred option (lowest average utilities)

6.4.2 Part-worth utilities and standard deviation – by user role (RQ1b)

Attributes	Attribute levels	Full sample		Drivers - employees		Drivers – self-employed		Fleet managers		Branch and depot		Other roles	
		Average utilities	Standard deviation	Average utilities	Standar deviation	Average utilities	Standar deviation	Average utilities	Standar deviation	Average utilities	Standar deviation	Average utilities	Standar deviation
Purchase price	€30,000 excl. VAT	**28.48715**	44.12584	**24.93751**	38.48258	**33.21353**	53.21018	**19.33245**	23.23561	**29.16237**	36.90153	19.65711	23.21308
	€45,000 excl. VAT	22.29630	30.94743	15.10217	27.25810	24.08268	26.18742	13.33345	26.67788	27.39834	44.23856	**24.91975**	43.14447
	€60,000 excl. VAT	-10.29328	30.69409	-5.89482	30.97103	-18.02863	35.85678	14.72696	21.30909	-11.76439	29.56127	**-24.90511**	22.07734
	€75,000 excl. VAT	**-40.49017**	48.38506	**-34.14486**	36.34588	**-39.26758**	53.20914	**-47.39286**	20.91632	**-44.79632**	39.11912	-19.67175	51.50178
Payload & cargo volume	< 300 kg / 3 m³	**-52.85235**	58.22995	-37.55965	51.22809	**-48.27599**	51.98943	**-102.39097**	36.73957	-50.94597	51.94712	**-61.97119**	36.42462
	300–600 kg / 3-6 m³	-8.10039	33.61804	-4.92275	42.54178	-21.43425	31.62963	19.33705	34.87821	-20.96538	28.49138	-20.51484	24.74563
	600–900 kg / 6–8 m³	29.28690	30.13902	**23.65935**	32.93813	29.95677	30.28691	**45.74586**	27.15108	28.65711	28.06065	**46.90440**	30.15100
	> 900 kg / 8-10 m³	**31.66584**	57.68079	18.82305	57.06020	**39.75347**	45.00298	37.30806	41.13158	**43.25424**	52.52140	35.58163	30.83613
Battery range	< 100 km	**-79.87179**	48.22910	**-78.61160**	47.75770	**-77.81239**	51.71320	**-74.25855**	38.37472	**-70.00759**	25.50072	**-47.04094**	29.35631
	100–150 km	-13.09335	31.82602	-16.67520	33.77801	-23.75201	40.50767	14.10394	21.10866	-3.30998	22.98047	5.33555	33.44804
	150–200 km	37.97668	31.85265	33.86182	31.67639	44.99637	25.86484	19.95099	23.05014	**39.63637**	22.53484	**20.30609**	41.02736
	> 200 km	**54.98846**	55.40936	**61.42498**	56.94445	**56.56803**	56.88609	**40.20362**	38.39247	33.68121	30.32435	21.39930	21.05239

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Attributes	Attribute levels	Full sample		Drivers - employees		Drivers – self-employed		Fleet managers		Branch and depot		Other roles	
		Average utilities	Standard deviation	Average utilities	Standar deviation	Average utilities	Standar deviation	Average utilities	Standar deviation	Average utilities	Standar deviation	Average utilities	Standar deviation
Multi-temperature zones	No cooling	**14.95256**	46.19757	**18.15777**	46.68050	**14.08062**	34.19035	**25.82917**	25.44021	**22.69592**	34.09278	-33.00047	61.00131
	Single-zone cooling	-2.80002	28.29407	-3.05057	35.70288	0.96848	34.29341	**-19.53224**	22.58678	10.04620	17.76189	-14.63819	23.60565
	Double-zone	**-6.81729**	32.97996	**-13.70700**	29.75798	1.54509	32.85555	3.23122	26.45334	**-17.11503**	31.26609	21.86717	60.74102
	Multi-zone cooling	-5.33525	29.16453	-1.40021	31.38669	-16.59419	23.62941	-9.52814	24.82566	-15.62709	22.01311	**25.77148**	35.58595
Energy management system	Standard driving	**-16.96066**	25.10988	**-10.57802**	29.34082	**-15.40728**	22.89064	**-24.58511**	22.80620	**-25.46959**	25.40130	**-20.92313**	22.65069
	Eco driving	**7.61415**	19.59667	0.76011	24.30060	**19.23861**	21.66341	-1.55819	20.92820	**13.53473**	40.56762	**26.14668**	35.52656
	Advanced eco driving	3.32953	23.68557	**5.79692**	32.43940	-4.48972	25.36592	-4.35518	17.27971	11.99278	19.03365	11.41489	24.88238
	Smart driving	6.01698	24.82609	4.02099	29.24055	0.65839	20.27420	**30.49848**	19.55749	-0.05793	39.53150	-16.63844	18.32242
Swapbox	No swapbox	**6.14172**	29.69873	**7.57220**	29.13126	**11.48346**	25.75982	4.41654	34.07934	-2.85477	34.10269	**-21.62922**	25.42930
	Basic swapbox	-0.92509	25.12387	-0.01783	27.45143	**-6.58993**	21.48714	**7.20931**	31.94695	**8.70940**	33.88321	5.24395	16.27978
	Mobile swapbox	-1.21580	20.90482	-2.97824	28.26544	-6.54829	20.37741	3.01344	15.26081	**-3.57987**	16.04384	**18.06287**	18.43802
	Smart foldable	**-4.00083**	22.40509	**-4.57614**	28.60671	1.65476	22.91452	**-14.63930**	22.95861	-2.27476	32.11541	-1.67760	17.36921

Most preferred option (highest average utilities), least preferred option (lowest average utilities)

6.4.3 Part-worth utilities and standard deviation – by experience level (RQ1c)

Attributes	Attribute levels	Full sample		Low experience		Medium experience		High experience	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Purchase price	€30,000 excl. VAT	**28.48715**	44.12584	**15.35294**	37.07959	20.62768	47.04328	**32.97143**	40.56798
	€45,000 excl. VAT	22.29630	30.94743	16.76772	33.29229	**24.53908**	28.25552	21.36594	31.49831
	€60,000 excl. VAT	-10.29328	30.69409	4.90922	33.57262	-14.36343	30.42624	-8.39495	26.26244
	€75,000 excl. VAT	**-40.49017**	48.38506	**-37.02988**	46.20092	**-30.80333**	43.36934	**-45.94242**	46.89999
Payload & cargo volume	< 300 kg / 3 m³	**-52.85235**	58.22995	**-34.70021**	44.87419	**-61.94986**	48.00865	**-48.11773**	63.92693
	300–600 kg / 3-6 m³	-8.10039	33.61804	-6.47927	30.95755	-11.38350	38.63573	-8.36716	28.82849
	600–900 kg / 6–8 m³	29.28690	30.13902	15.63950	33.13080	**39.47499**	30.25417	22.85806	31.33959
	> 900 kg / 8-10 m³	**31.66584**	57.68079	**25.53997**	30.45132	33.85836	54.62925	**33.62683**	60.74950
Battery range	< 100 km	**-79.87179**	48.22910	**-65.80026**	38.34340	**-72.74835**	51.19690	**-85.93796**	50.29501
	100–150 km	-13.09335	31.82602	-15.92285	40.58206	-24.51105	34.12163	1.52099	25.71465
	150–200 km	37.97668	31.85265	38.94445	32.07352	39.97965	29.68456	36.16284	26.66481
	> 200 km	**54.98846**	55.40936	**42.77866**	56.82502	**57.27975**	55.62196	**48.25412**	50.00292
Multi-temperature zones	No cooling	**14.95256**	46.19757	6.88420	51.67264	**12.36860**	43.93537	**23.78612**	36.61295
	Single-zone cooling	-2.80002	28.29407	-6.94839	29.32865	5.544710	25.01762	**-10.63672**	31.89923
	Double-zone cooling	**-6.81729**	32.97996	**-7.26727**	42.54944	-5.55254	39.54300	-6.93233	23.23611
	Multi-zone cooling	-5.33525	29.16453	**7.33146**	30.56821	**-12.36076**	29.64133	-6.21708	29.40870
Energy management system	Standard driving	**-16.96066**	25.10988	**-16.06385**	24.07168	**-10.34668**	27.07412	**-14.73694**	23.48303
	Eco driving	**7.61415**	19.59667	-9.23314	26.03996	**6.57329**	22.53989	**11.38839**	21.10620
	Advanced eco driving	3.32953	23.68557	3.24783	38.33332	-1.69068	27.02623	4.60737	20.78321
	Smart driving	6.01698	24.82609	22.04916	23.17241	5.46408	22.49323	-1.25882	28.64450
Swapbox	No swapbox	**6.14172**	29.69873	-3.16146	36.54974	**10.60314**	30.82166	**6.85535**	26.71781
	Basic swapbox	-0.92509	25.12387	**10.39998**	27.46911	**-8.72151**	21.11224	1.60244	28.88742
	Mobile swapbox	-1.21580	20.90482	-1.32947	27.87421	2.18640	20.55027	**-5.47945**	26.79959
	Smart foldable swapbox	**-4.00083**	22.40509	**-5.90905**	37.12108	-4.06803	26.53497	-2.97834	20.92093

Most preferred option (highest average utilities), least preferred option (lowest average utilities)

6.4.4 Part-worth utilities and standard deviation – by vehicle type (RQ1d)

Attributes	Attribute levels	Full sample		Electric van users		Diesel van users	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Purchase price	€30,000 excl. VAT	28.48715	44.12584	19.22261	33.60059	33.98149	48.90409
	€45,000 excl. VAT	22.29630	30.94743	20.30489	29.95573	23.01627	31.56565
	€60,000 excl. VAT	-10.29328	30.69409	5.25010	30.62694	-21.10668	29.28922
	€75,000 excl. VAT	-40.49017	48.38506	-44.77760	40.08205	-35.89109	46.89165
Payload & cargo volume	< 300 kg / 3 m³	-52.85235	58.22995	-42.87790	46.57839	-55.75847	59.83321
	300–600 kg / 3-6 m³	-8.10039	33.61804	-2.58369	30.91679	-10.88520	35.33258
	600–900 kg / 6–8 m³	29.28690	30.13902	28.85519	27.68056	27.96324	34.88107
	> 900 kg / 8-10 m³	31.66584	57.68079	16.60640	52.27889	38.68043	55.87959
Battery range	< 100 km	-79.87179	48.22910	-83.82080	43.48364	-75.76824	53.12881
	100–150 km	-13.09335	31.82602	-9.01584	30.83562	-10.69943	30.35691
	150–200 km	37.97668	31.85265	40.14578	29.80929	34.32940	30.15545
	> 200 km	54.98846	55.40936	52.69086	51.70543	52.13827	55.26631
Multi-temperature zones	No cooling	14.95256		9.16245	50.07969	18.09674	39.18146
	Single-zone cooling	-2.80002	28.29407	-8.67418	28.09076	1.99409	28.07856
	Double-zone cooling	-6.81729	32.97996	-6.21593	37.63887	-8.36524	33.41193
	Multi-zone cooling	-5.33525	29.16453	5.72766	29.56026	-11.72559	26.82588
Energy management system	Standard driving	-16.96066	25.10988	-19.54519	22.57814	-8.85846	23.94303
	Eco driving	7.61415	19.59667	0.37974	28.47331	10.86757	19.22998
	Advanced eco driving	3.32953	23.68557	15.13350	29.92331	-8.64792	24.22391
	Smart driving	6.01698	24.82609	4.03194	29.60377	6.63881	23.31843
Swapbox	No swapbox	6.14172	29.69873	-0.67449	23.29865	10.55274	33.33775
	Basic swapbox	-0.92509	25.12387	2.20440	29.90102	-4.25485	23.13003
	Mobile swapbox	-1.21580	20.90482	7.53341	23.21582	-6.30628	20.51574
	Smart foldable swapbox	-4.00083	22.40509	-9.06332	25.13204	0.00839	23.77872

Most preferred option (highest average utilities), least preferred option (lowest average utilities)

6.4.5 Part-worth utilities and standard deviation – by delivery type (RQ1e)

Attributes	Attribute levels	Full sample		Postal delivery		Food delivery		Cold chain delivery		Medical delivery		Retail delivery		Other deliveries	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Purchase price	€30,000 excl. VAT	**28.48715**	44.12584	**25.96570**	41.96466	**40.75069**	22.09135	**20.69233**	30.63978	**15.35411**	30.89160	**24.43789**	32.50944	**43.69339**	23.57279
	€45,000 excl. VAT	22.29630	30.94743	18.34022	25.43817	16.85755	34.31573	32.40820	34.37814	13.55457	33.45988	24.17385	28.59384	17.19092	43.93197
	€60,000 excl. VAT	-10.29328	30.69409	-11.00570	28.87012	-17.44968	23.56933	-13.63384	26.14562	-1.95152	24.15869	-11.30628	33.78680	-20.15450	16.38567
	€75,000 excl. VAT	**-40.49017**	48.38506	**-33.30022**	45.74760	**-40.15856**	34.81686	**-39.46668**	44.04740	**-26.95716**	34.37986	**-37.30546**	42.99475	**-40.72982**	47.57176
Payload & cargo volume	< 300 kg / 3 m³	**-52.85235**	58.22995	**-49.93341**	57.52302	**-74.39619**	55.61778	**-63.90721**	38.64615	**-69.16667**	45.33597	**-65.44434**	56.96263	**-79.83469**	30.81451
	300–600 kg / 3-6 m³	-8.10039	33.61804	-7.34711	33.57775	-11.09806	39.98751	-15.54148	33.12095	-9.61258	38.72805	-6.50155	43.47704	-6.45312	16.44295
	600–900 kg / 6–8 m³	29.28690	30.13902	25.36430	30.10936	**42.96800**	34.44350	35.96527	27.60908	22.98090	26.30130	25.17349	30.89846	**61.67922**	33.38350
	> 900 kg / 8-10 m³	**31.66584**	57.68079	**31.91622**	55.60606	42.52625	54.95966	**43.48341**	34.30353	**55.79835**	49.81666	**46.77241**	58.74495	24.60859	45.07684
Battery range	< 100 km	**-79.87179**	48.22910	**-85.39125**	52.31530	**-47.03052**	45.74177	**-73.39688**	49.99761	**-56.10038**	48.54335	**-62.91722**	50.18651	**-59.61445**	40.83621
	100–150 km	-13.09335	31.82602	-14.28391	34.43312	-27.06926	37.33243	-6.77270	29.97032	-33.77708	28.26392	-15.17666	29.46689	23.80165	38.77779
	150–200 km	37.97668	31.85265	41.40608	30.49180	23.84118	38.64563	26.48234	30.86657	27.72377	40.26470	28.47108	36.12791	2.23619	34.63392
	> 200 km	**54.98846**	55.40936	**58.26908**	61.26706	**50.25860**	43.59117	**53.68723**	36.01627	**62.15370**	39.88124	**49.62280**	39.57108	**33.57662**	46.52682

Attributes	Attribute levels	Full sample		Postal delivery		Food delivery		Cold chain delivery		Medical delivery		Retail delivery		Other deliveries	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Multi-temperature zones	No cooling	**14.95256**	46.19757	**22.93793**	40.83099	**-23.45260**	45.17499	**-29.49552**	45.05650	**-12.59296**	45.90221	**18.24166**	35.46176	16.49950	22.02633
	Single-zone cooling	-2.80002	28.29407	-3.17550	25.55248	-8.32719	30.54770	4.81510	26.97377	-5.00927	23.51366	**-11.80737**	18.06475	**-23.33115**	15.04087
	Double-zone	**-6.81729**	32.97996	**-10.02816**	33.58137	**22.31962**	38.51073	**14.35526**	42.21756	**12.66330**	41.18544	-1.28051	44.02860	-15.06956	26.60940
	Multi-zone cooling	-5.33525	29.16453	-9.73427	25.67395	9.46018	34.96196	10.32516	30.11682	4.93894	30.12494	-5.15377	28.76799	**21.90121**	25.62191
Energy management system	Standard driving	**-16.96066**	25.10988	**-17.49286**	25.36478	6.25813	31.85264	-2.49634	26.50221	**-22.09664**	30.22280	**-11.51690**	24.40098	**-9.60059**	22.35541
	Eco driving	**7.61415**	19.59667	6.30065	20.35843	-4.44103	20.62466	1.25303	28.99109	**23.46323**	28.16830	**15.25777**	24.94631	0.11208	43.63853
	Advanced eco driving	3.32953	23.68557	4.30477	23.81827	**-15.88609**	25.56134	**-3.23080**	29.96862	-3.01263	25.43189	-3.57996	27.85690	3.04500	19.26558
	Smart driving	6.01698	24.82609	**6.88744**	26.37190	**14.06900**	22.70752	**4.47411**	22.65895	1.64604	25.25077	-0.16090	19.72336	**6.44351**	21.60430
Swapbox	No swapbox	**6.14172**	29.69873	**9.23905**	29.99762	**-4.14781**	28.71313	0.22962	37.65132	2.50046	31.68110	**9.01046**	23.21969	**-12.85966**	34.53194
	Basic swapbox	-0.92509	25.12387	-1.17441	24.65060	-2.72908	18.61905	**8.43665**	21.46377	**5.68510**	20.53679	**-15.84682**	26.79756	**22.82721**	20.20669
	Mobile swapbox	-1.21580	20.90482	-2.10174	22.83812	**4.83589**	21.77750	2.80243	27.60982	-1.08393	22.45497	5.90876	24.27036	-2.38371	16.23912
	Smart foldable	**-4.00083**	22.40509	**-5.96290**	26.54224	2.04099	24.35589	**-11.46869**	20.34061	**-7.10163**	30.74870	0.92760	29.20513	-7.58384	21.43042

Most preferred option (highest average utilities), least preferred option (lowest average utilities)

6.4.6 Part-worth utilities and standard deviation – by delivery area (RQ1f)

Attributes	Attribute levels	Full sample		City center		City periphery		Residential area		Industrial area		Rural area		Other areas	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Purchase price	€30,000 excl. VAT	28.48715	44.12584	28.92742	48.74967	37.00341	39.06324	29.88606	30.51275	29.55927	30.41137	25.95866	32.93965	-95.72982	2.00582
	€45,000 excl. VAT	22.29630	30.94743	25.66133	31.11900	25.65123	33.62783	21.28519	35.92741	23.20372	40.91443	21.45514	34.56844	-3.38677	11.85357
	€60,000 excl. VAT	-10.29328	30.69409	-4.09012	33.10317	-12.50716	27.85466	-12.95122	25.05248	-7.56003	22.74792	-10.36454	25.77189	8.20151	0.66097
	€75,000 excl. VAT	-40.49017	48.38506	-50.49863	44.53644	-50.14749	41.82994	-38.22003	42.24921	-45.20296	36.86769	-37.04926	40.45831	90.91507	13.19842
Payload & cargo volume	< 300 kg / 3 m³	-52.85235	58.22995	-63.09306	60.08179	-67.62897	52.40275	-67.89581	61.22321	-61.82319	64.70070	-56.35952	59.20777	-4.25070	1.52017
	300–600 kg / 3-6 m³	-8.10039	33.61804	-3.74231	30.61729	-7.54788	30.07525	-5.06300	33.51746	-7.76838	24.91633	-6.76970	33.22710	66.45029	6.06045
	600–900 kg / 6–8 m³	29.28690	30.13902	29.68255	32.51672	37.73429	34.44894	33.82659	35.53830	28.06990	32.91261	28.41551	35.40246	-57.57256	6.15055
	> 900 kg / 8-10 m³	31.66584	57.68079	37.15282	56.99253	37.44256	49.13359	39.13222	52.23151	41.52167	46.18676	34.71371	49.35272	-4.62703	1.61028
Battery range	< 100 km	-79.87179	48.22910	-73.33508	43.13006	-82.92703	45.52526	-85.42561	41.56231	-77.43133	35.60248	-91.02299	53.24043	45.87883	2.50813
	100–150 km	-13.09335	31.82602	-11.62125	28.62149	-3.72014	35.28975	-1.32866	29.94873	-9.95417	34.90951	-12.81070	30.50823	25.24286	4.36448
	150–200 km	37.97668	31.85265	38.19672	29.33659	33.24726	30.97321	32.57385	27.11187	33.80881	30.60134	38.81198	30.71845	-37.23666	0.58530
	> 200 km	54.98846	55.40936	46.75961	44.41088	53.39990	47.77351	54.18042	48.42240	53.57669	41.58651	65.02171	57.69454	-33.88502	1.27105

Attributes	Attribute levels	Full sample		City center		City periphery		Residential area		Industrial area		Rural area		Other areas	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Multi-temperature zones	No cooling	**14.95256**	46.19757	**6.98106**	39.64272	**16.08411**	47.81954	**13.82703**	46.96452	**5.22582**	52.23690	**19.34222**	41.69034	**-42.93472**	1.42330
	Single-zone	-2.80002	28.29407	**-6.24843**	27.41318	-2.70466	26.70080	1.30980	24.07204	**-3.62599**	21.73324	-6.45819	21.78172	-8.74512	1.43846
	Double-zone	**-6.81729**	32.97996	0.01295	34.52584	-4.86826	34.98222	**-9.80020**	36.58739	1.39258	44.63798	**-8.73194**	32.46956	21.81890	3.05920
	Multi-zone cooling	-5.33525	29.16453	-0.74558	24.80238	**-8.51119**	31.44517	-5.33662	27.84415	-2.99241	25.60529	-4.15210	27.57052	**29.86095**	5.92096
Energy management system	Standard driving	**-16.96066**	25.10988	**-16.69788**	22.57600	**-11.98503**	23.21217	**-12.00077**	20.33249	**-16.55689**	22.79979	**-14.82453**	27.59688	-26.12347	1.20216
	Eco driving	**7.61415**	19.59667	2.17859	24.90250	**7.26730**	22.88239	**9.57747**	22.98322	**14.11915**	28.51699	**14.14800**	21.53622	25.75535	1.26737
	Advanced eco driving	3.32953	23.68557	6.76126	24.98164	2.00759	20.60463	-0.38924	22.13864	-2.07278	17.52169	-2.63644	26.11381	**30.47392**	5.25067
	Smart driving	6.01698	24.82609	**7.75803**	26.69973	2.71015	20.30350	2.81253	21.02213	4.51051	25.86230	3.31297	21.20182	**-30.10580**	2.78113
Swapbox	No swapbox	**6.14172**	29.69873	-2.07157	30.20169	**-5.44081**	25.50935	**8.10729**	32.33104	-4.20350	28.03982	**12.78009**	26.90269	**45.23076**	2.09094
	Basic swapbox	-0.92509	25.12387	**9.39002**	24.61592	0.39100	19.36371	**-6.36551**	22.83302	**13.31544**	18.50932	**-10.81151**	19.35101	**-27.61062**	2.13759
	Mobile swapbox	-1.21580	20.90482	-0.38106	22.82129	**7.48817**	19.70983	-0.30315	19.68275	3.60526	16.54425	-2.89592	20.58781	-6.41987	2.12687
	Smart foldable	**-4.00083**	22.40509	**-6.93738**	21.30115	-2.43837	20.71263	-1.43863	23.30741	**-12.71720**	27.32053	0.92735	21.45095	-11.20028	2.17351

Most preferred option (highest average utilities), least preferred option (lowest average utilities)

6.4.7 Part-worth utilities and standard deviation – by countries (RQ1g)

Attributes	Attribute levels	Full sample		Belgum		Greece		Norway		Italy		Poland		The Netherlands		France		Germany		Spain		Other countries	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Purchase price	€30,000 excl. VAT	**28.48715**	44.12584	**28.52764**	30.53537	**45.63275**	38.85874	6.69453	34.6723	**34.28542**	51.45579	**25.95753**	46.48217	**33.67496**	20.6165	**-34.27610**	17.66968	27.90049	35.55424	-34.08505	4.18598	-4.60870	32.39426
	€45,000 excl. VAT	22.2963	30.94743	19.60355	26.15074	19.89242	57.11943	-1.61101	22.66297	0.08137	29.09358	22.14968	30.13634	**-22.6349**	2.80602	19.06461	20.13016	**37.40531**	33.37325	40.04460	12.77923	**48.17728**	8.09139
	€60,000 excl. VAT	-10.2933	30.69409	-4.29077	27.58764	-13.0119	25.19258	**30.38720**	24.51885	-14.52999	33.75325	-15.27240	27.80645	4.70716	5.49113	**29.69829**	15.01539	-6.69996	22.31801	**-52.45302**	29.8166	**-27.3675**	6.7231
	€75,000 excl. VAT	**-40.4902**	48.38506	**-43.84042**	32.7448	**-52.5132**	41.62478	**-35.47072**	35.37507	**-19.83680**	46.89658	**-32.83480**	53.39007	-15.74722	22.64159	-14.48680	21.94023	**-58.6059**	44.87265	**46.49347**	23.06568	-16.2011	25.74115
Payload & cargo volume	< 300 kg / 3 m³	**-52.8524**	58.22995	**-47.97225**	44.71521	**-22.9968**	30.10566	**-52.51072**	49.14926	**-78.26475**	21.97797	**-45.14460**	58.53190	**-54.04853**	9.03146	**-41.22061**	8.13670	**-76.9017**	23.14216	-33.73747	19.94991	-6.56167	6.39264
	300–600 kg / 3-6 m³	-8.10039	33.61804	0.11953	36.39127	-21.2713	27.30782	-4.27001	21.27886	9.99047	46.30209	-11.65166	34.03313	-26.87006	41.84733	6.08572	25.00222	**17.01098**	37.42027	22.89467	55.87795	18.79265	36.7939
	600–900 kg / 6–8 m³	29.2869	30.13902	**38.50339**	31.2057	2.30298	24.6461	15.42199	16.97899	**50.04244**	27.08062	23.00228	34.19675	**88.49662**	9.59525	**74.86673**	11.40504	49.1206	31.84264	**48.86973**	13.87506	**44.26824**	15.68972
	> 900 kg / 8-10 m³	**31.66584**	57.68079	9.34932	57.40207	**41.96503**	29.23105	**41.35874**	42.54451	18.23184	25.15319	**33.79398**	54.74006	-7.57803	40.43396	-39.73184	14.60789	10.77011	40.44512	**-38.02692**	67.93688	**-56.4992**	27.01012
Battery range	< 100 km	**-79.8718**	48.2291	**-69.09237**	57.51424	**-45.7488**	22.88273	**-80.23035**	27.45995	**-49.26510**	19.17457	**-86.20648**	43.9076	**-52.04610**	24.23714	16.1075	25.21633	**-21.7599**	45.12589	12.00466	26.9695	-35.7761	7.34483
	100–150 km	-13.0934	31.82602	-9.71301	29.4001	-9.72102	42.20414	-13.51176	17.64787	7.68959	29.67395	-11.77657	33.49604	-24.22575	10.15963	-27.91811	12.50276	-5.81162	42.03653	**-53.53555**	19.24583	36.93301	9.33652
	150–200 km	37.97668	31.85265	32.54623	29.45345	**35.48953**	36.02791	37.86646	30.46541	16.66872	12.32129	39.28198	28.764	**47.28689**	11.45704	**-32.45571**	4.6887	-9.02917	13.7918	**43.26888**	30.666	**-59.9021**	13.09422
	> 200 km	**54.98846**	55.40936	**46.25915**	54.98028	19.98032	21.48752	**55.87564**	23.91001	**24.90679**	29.2644	**58.70107**	57.50804	28.98496	25.42025	**44.26633**	14.09819	**36.60073**	25.78057	-1.73799	38.86554	**58.74512**	15.74542

Attributes	Attribute levels	Full sample		Belgum		Greece		Norway		Italy		Poland		The Netherlands		France		Germany		Spain		Other countries	
		Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation	Average utilities	Standard deviation
Multi-temperature zones	No cooling	**14.95256**	46.19757	**12.23721**	48.16704	**-58.7566**	48.11704	**21.02273**	35.78906	**-16.21851**	49.16172	23.97929	33.21171	5.45635	23.89852	-5.99472	5.95761	**32.82039**	39.27092	-15.99711	31.78892	16.73553	12.59059
	Single-zone cooling	-2.80002	28.29407	-11.49081	38.35182	-6.9003	24.54308	-13.6257	30.55038	**19.53707**	22.57458	5.97398	24.69075	**28.15793**	4.68397	3.69543	30.63171	**-34.6481**	26.54017	-10.30328	24.93737	-23.0846	9.13210
	Double-zone cooling	**-6.81729**	32.97996	**-11.94716**	32.81425	**63.02245**	51.33126	7.2261	23.59158	6.12636	41.25863	-14.19483	28.45042	**-36.63802**	16.04236	**-33.64448**	13.00713	-17.969	33.55016	**47.91733**	40.37837	**65.33772**	14.41104
	Multi-zone cooling	-5.33525	29.16453	11.20077	26.91975	2.6345	31.20451	**-14.62313**	45.04091	-9.44491	50.14374	**-15.75843**	26.65696	3.02374	8.97985	**35.94377**	24.92882	19.79666	35.33927	**-21.61695**	18.02256	**-58.9886**	17.23681
Energy management system	Standard driving	**-16.9607**	25.10988	**-10.0501**	24.04262	1.77213	19.95182	**-43.24786**	26.9934	**-25.83668**	12.34976	**-12.88483**	26.97495	**38.96890**	14.19071	**50.73520**	8.99547	**23.58216**	20.2348	**50.87016**	29.30721	**-39.7135**	3.44552
	Eco driving	**7.61415**	19.59667	-4.67240	35.26814	9.24007	24.16565	11.68261	27.56655	**18.42110**	33.34019	**9.76942**	19.37697	-22.43744	36.15568	-23.27564	15.02266	**-18.5012**	17.9248	-7.73155	18.10951	**55.47152**	5.30706
	Advanced eco driving	3.32953	23.68557	**8.92580**	29.00794	**12.45417**	33.15948	5.47404	22.97233	2.53174	16.63645	-0.19888	23.65843	21.00189	11.09115	4.95365	24.93205	-0.39756	16.37519	-19.59129	35.63964	-4.57223	11.96779
	Smart driving	6.01698	24.82609	5.79670	36.65124	**-23.4664**	23.2838	**26.09122**	19.21115	4.88384	24.37504	3.31429	22.53424	**-37.53335**	14.77414	**-32.41320**	37.64805	-4.68344	21.41457	**-23.54731**	49.06385	-11.1858	18.35388
Swapbox	No swapbox	**6.14172**	29.69873	-1.87729	23.68143	**-2.10244**	18.46315	**-13.38576**	25.44251	-9.08450	35.18728	**14.11317**	29.60849	-16.90291	9.9112	18.47756	11.92063	-11.0676	25.08006	11.11788	22.2407	31.42866	4.90109
	Basic swapbox	-0.92509	25.12387	**-11.40684**	23.38254	**2.35032**	23.08463	**15.86653**	24.45533	**19.42411**	58.70811	-0.9796	25.95691	**71.90516**	30.71619	**64.32783**	25.25158	20.86139	15.15604	**-24.73986**	3.48405	-30.5769	6.20890
	Mobile swapbox	-1.21580	20.90482	**20.59202**	25.51673	0.92160	20.92166	4.72568	21.22242	4.97407	27.36427	**-11.04728**	20.24062	**-56.02309**	11.29551	**-8.71380**	18.41367	**31.74987**	14.64419	-18.35426	20.73967	**-38.9641**	4.83042
	Smart foldable swapbox	**-4.00083**	22.40509	-7.30788	18.52285	-1.16948	19.02686	-7.20644	40.71167	**-15.31369**	14.68157	-2.08629	23.05244	1.02083	12.27044	**-74.09160**	18.73784	**-41.5437**	12.79769	**31.97625**	10.50055	**38.11231**	3.52235

Most preferred option (highest average utilities), least preferred option (lowest average utilities)

6.5 Overview profile characteristics latent user segments (Annex 5)

Group	Sub-group	Cargo-capacity-oriented users	Innovation-oriented users	Price-oriented users	Range-oriented users	Significance (Pearson chi-square)
User role	**Drivers (empl.)**	39.4%	51.2%	45.1%	50.0%	Overrepresentation of national fleet managers in the cargo-capacity-oriented user segment (p = .045 (p < .05)); all other p ≥ .05
	Drivers (self-empl.)	30.7%	22.4%	27.5%	29.8%	
	Local fleet managers	4.4%	4.0%	8.8%	4.8%	
	Regional fleet managers	0.0%	0.8%	0.0%	0.0%	
	National fleet managers	3.6%	0.0%	1.1%	1.0%	
	Branch / depot managers	8.8%	4.0%	7.7%	10.6%	
	Other role	13.1%	17.6%	9.9%	3.8%	
Exper-ienc level	**< 1 year**	6.6%	9.6%	3.3%	6.7%	No significance (p ≥ .05)
	1-2 years	6.6%	16.0%	13.2%	10.6%	
	3-5 years	22.6%	21.6%	16.5%	23.1%	
	6-10 years	23.4%	21.6%	23.1%	24.0%	
	11-15 years	15.3%	7.2%	14.3%	14.4%	
	> 15 years	25.5%	24.0%	29.7%	21.2%	
Vehicle type	**Electric van**	32.1%	43.2%	35.2%	36.5%	No significance (p ≥ .05)
	Diesel van	67.2%	53.6%	63.7%	62.5%	
	Other vehicle type	0.7%	3.2%	1.1%	1.0%	
Delivery type	**Parcel delivery**	86.1%	84.7%	81.3%	97.1%	Overrepresentation of users involved in parcel delivery in the range-oriented segment (p = .004 (p < .05)); overrepresentation of food delivery users in the innovation- and price-oriented segments (p = .018 (p < .05)); all other p ≥ .05
	Food delivery	21.9%	21.0%	11.0%	9.6%	
	Cold chain delivery	15.3%	12.1%	9.9%	7.7%	
	Medical delivery	20.4%	20.2%	7.7%	16.3%	
	Retail delivery	27.0%	21.8%	18.7%	19.2%	
	Other delivery	6.6%	4.0%	4.4%	2.9%	
Delivery area	**City centre**	67.9%	64.8%	64.8%	44.2%	Overrepresentation of city centre users in the cargo-capacity-oriented segment (p = .001 (p < .05));
	Urban periphery	54.0%	35.2%	57.1%	44.2%	
	Residential area	55.5%	40.8%	45.1%	50.0%	
	Rural area	48.2%	43.2%	41.8%	65.4%	

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	Industrial area	35.0%	28.8%	28.6%	25.0%	overrepresentation of urban periphery users in innovation- and price-oriented segments (p = .003 (p < .05))
	Other area	2.2%	3.2%	0.0%	2.9%	
Country	**Belgium**	21.9%	19.5%	22.0%	21.2%	No significance (p ≥ .05)
	France	0.7%	1.6%	1.1%	1.0%	
	Germany	1.5%	1.6%	4.4%	1.9%	
	Greece	2.9%	8.9%	6.6%	0.0%	
	Italy	1.5%	0.8%	3.3%	1.9%	
	Netherlands	1.5%	0.0%	1.1%	1.0%	
	Norway	13.1%	8.1%	4.4%	9.6%	
	Poland	59.1%	57.7%	56.0%	68.3%	
	Spain	0.7%	1.6%	0.0%	1.0%	
	Other country	0.0%	1.6%	2.2%	1.0%	

6.6 Market simulation scenarios (Annex 6)

Market simulation results – multi-temperature zone:

Price level	Baseline	Multi-temp. zone L2	Multi-temp. zone L3	Multi-temp. zone L4
Price changed in the product "multi-temperature zone L2"				
30,000 €	35.7%	22.6%	21.2%	20.5%
45,000 €	35.4%	24.3%	20.3%	19.9%
60,000 €	38.7%	16.6%	22.8%	21.9%
75,000 €	40.1%	13.0%	24.2%	22.8%
Price changed in the product "multi-temperature zone L3"				
30,000 €	35.7%	22.6%	21.2%	20.5%
45,000 €	35.1%	21.8%	23.1%	20.0%
60,000 €	37.2%	24.2%	17.0%	21.5%
75,000 €	38.9%	25.6%	12.4%	23.1%
Price changed in the product "multi-temperature zone L4"				
30,000 €	35.7%	22.6%	21.2%	20.5%
45,000 €	35.3%	22.0%	20.5%	22.2%
60,000 €	36.8%	23.9%	22.1%	17.3%
75,000 €	37.8%	24.8%	23.6%	13.8%

Market simulation results – energy management system:

Price level	Baseline	Energy management system L2	Energy management system L3	Energy management system L4
Price changed in the product "energy management system L2"				
30,000 €	18.5%	27.3%	26.0%	28.2%
45,000 €	18.1%	28.3%	25.6%	28.1%
60,000 €	20.1%	21.1%	27.8%	30.9%
75,000 €	21.2%	16.7%	29.3%	32.8%
Price changed in the product "energy management system L3"				
30,000 €	18.5%	27.3%	26.0%	28.2%
45,000 €	18.0%	27.0%	27.2%	27.8%
60,000 €	20.1%	29.3%	20.0%	30.6%
75,000 €	21.4%	30.5%	15.5%	32.6%
Price changed in the product "energy management system L4"				
30,000 €	18.5%	27.3%	26.0%	28.2%
45,000 €	18.1%	27.3%	25.7%	28.9%
60,000 €	20.5%	30.3%	28.5%	20.8%
75,000 €	22.0%	32.1%	30.6%	15.3%

Market simulation results – swap box:

Price level	Baseline	Swap box L2	Swap box L3	Swap box L4
Price changed in the product "swap box L2"				
30,000 €	28.6%	24.9%	23.9%	22.6%
45,000 €	28.1%	25.8%	23.6%	22.5%
60,000 €	30.8%	17.4%	26.5%	25.3%
75,000 €	32.2%	13.1%	28.2%	26.6%
Price changed in the product "swap box L3"				
30,000 €	28.6%	24.9%	23.9%	22.6%
45,000 €	28.0%	24.5%	25.3%	22.2%
60,000 €	29.7%	27.3%	18.7%	24.3%
75,000 €	31.3%	28.9%	14.1%	25.7%
Price changed in the product "swap box L4"				
30,000 €	28.6%	24.9%	23.9%	22.6%
45,000 €	28.0%	24.6%	23.5%	23.9%
60,000 €	29.9%	27.4%	25.5%	17.2%
75,000 €	31.2%	28.5%	26.8%	13.5%

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