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MaaSolutions

MaaSolutions End-User Analysis Report – Liepāja City Municipality Central Administration

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Definitions, Acronyms and Abbreviations

Acronym	Title
A/B	A/B testing: an experimental method in which an audience is randomly divided into two categories (A and B) to compare performance (e.g., click-through or conversion rates) and determine which variant is better.
Car	Passenger car.
Car sharing	A service that allows individuals to rent or hire a passenger car using a mobile app or website. This service applies to shared vehicles within the meaning of the Road Traffic Law of Latvia.
Dummy variable	Binary 0/1 indicator with values 0 and 1 (e.g. 1 if the plan has a term of "month", otherwise 0).
(E-)bike	Collective term for both bicycles and electric bicycles in cases where data are collected and analysed without distinguishing between these two types of vehicles (for example, in the questionnaire wording “bicycle / electric bicycle”).
(E-)scooter	Collective term for both kick scooters and e-scooters in cases where data are collected and analysed without distinguishing between these two types of vehicles (for example, in the questionnaire wording “scooter / e-scooter”).
E-scooter	A scooter powered by an electric motor (excluding mechanical kick scooters propelled by pushing off with the foot, which together with e-scooters are covered by the term “(e-)scooter”).
IMAP	Liepāja City Integrated Mobility Action Plan until 2035.
MaaS	Mobility as a Service that integrates different transport modes and transport-related services into a single, comprehensive, demand-based mobility app, enabling users to plan and create a route for the chosen mode from point A to point B and combine it with other modes, and to pay for the journeys within the same app.
MaaS plan	The MaaS plan is a subscription that provides access to various modes of transport (e.g. public transport, shared (e-)bikes/e-scooters, car sharing, taxis (ride-hailing)) for a specified period and area with a single payment account. The plan usually specifies the types of transport included and the amount of use (e.g. unlimited number of trips on public transport; 60 minutes with a shared (e-)bike, 20 km with a shared car) and, if applicable, the rollover of unused allowance, the pricing model (fixed fee, variable fee according to usage with volume limits, excess volume tariffs, security

	deposit/excess), as well as usage benefits (discounts, family/tourism/corporate profiles, cancellation and compensation policy, customer support in the app). The study tested MaaS plan durations; the transport modes included; their usage/allowance levels; price levels; and unused-allowance rollover rates.
Mobility point	A hub for different modes of transport (public transport, micromobility, sharing, *park-and-ride*). The essence of a mobility point is to provide every user with convenient, co-located connections between multiple (at least two) transport modes–for example, public transport (bus, rail, etc.) and shared vehicles (including (e-)bikes, cars, and other micromobility such as e-scooters)–to reach nearby shopping, entertainment, leisure, and other services, thereby reducing the need to use private cars.[1]
Odds	An indicator describing the ratio of the probability of an event, *p*, to the probability of the opposite event, *1−p*; that is, *p/(1−p)*. In this report, odds refer to the ratio of choosing a MaaS plan to not choosing it.
Park & Ride (also *park-and-ride, P&R*)	A traffic management solution where parking spaces are provided in the city (e.g. at the bus station, city centre) or on access roads or on the outskirts of the city, allowing drivers to park their private vehicles and switch to public transport (or other sustainable mobility options), thus reducing congestion, emissions and car traffic in the city centre.
Peak hour	The period of time during which the highest intensity of vehicle or passenger traffic is observed on a given road section or public transport route.
Pre-defined MaaS plans (or pre-defined scenarios)	In accordance with the research design (see Appendix C), MaaS plans were prepared with different combinations of transport modes, usage volumes and prices. Each respondent was shown three of these MaaS plans and asked to evaluate each one with a binary purchase choice (Yes/No).
PT	Public transport.
QR	Quick Response code; a two-dimensional (2D) matrix barcode (also known as a square code) that can be scanned with a smartphone camera or scanner. Contains, for example, a link to a survey, web page or short text. Used in the study to quickly open the survey questionnaire.

[1] MoSARD. Guidelines for the inclusion of mobility points in planning regions' and municipalities' development programmes under the EU Cohesion Policy Programme 2021–2027, specific objective 5.1.1 "Promoting integrated social, economic and environmental development and cultural heritage, tourism and safety in urban functional areas", measure 5.1.1.3 "Development of public outdoor space". Retrieved from: https://www.varam.gov.lv/lv/media/37338/download?attachment

Random utility model	It is assumed that respondents choose the option with the highest utility (benefit), which has a predictable part (calculated from the attributes included in the study, such as price, minutes, kilometres, number of trips on public transport) and a random part.
Regular commuters	Respondents who answered “No, I am a temporary visitor/regular commuter to work, school, etc.” to the question “Do you live in Liepāja (within the city’s administrative boundaries)?” He chose the answer “No, I am a temporary visitor” and indicated his place of residence as a populated area in the South Kurzeme region, e.g. Grobiņa, Aizpute, Nīca, Pāvilosta, etc. Includes respondents who regularly travel to Liepāja for work/studies/leisure.
Residents	Includes regular commuters and residents of Liepāja City (if not separately identified).
Residents of Liepāja City	Respondents who chose the answer "Yes" to the question "Do you live in Liepāja (within the city's administrative boundaries)?" Includes young people, students, employed people, unemployed people, senior citizens, people with special needs, people with mobility impairments and people with disabilities.
Respondents	All study participants – regular commuters, residents of Liepāja City, and tourists.
Rollover of the unused allowance	Transfer of the volume of mobility services included in the MaaS plan but not used in the relevant period (for example, number of journeys by public transport, kilometres driven by car sharing or taxi, number of minutes by (e-)bike or e-scooter) to the next billing period, in line with the service provider’s rules. The term applies only to services with a clearly defined usage level (number of journeys, kilometres, minutes) and does not apply to services with unlimited use (for example, “unlimited trips per month”), which are valid only for the given plan period and are not rolled over to the next period.
Self-configured MaaS plans	Tasks where respondents put together their own MaaS plan. After all choices have been made, the system displays the total price of the MaaS plan and asks whether the respondent will choose this plan in a "Yes/No" format. Each respondent repeated these tasks twice.
SPSS	Statistical Package for the Social Sciences; a statistical analysis software package for the social sciences that allows complex data analysis and predictive analytics also without in-depth programming knowledge, using a graphical user interface and menus.

Stated preference	Survey tasks in which people make a choice between hypothetical (not yet existing) but realistically possible MaaS plans.
Summary Report	MaaSolutions end-user survey analysis report.
Tourists	Respondents who, in response to the question 'Do you live in Liepāja (within the city's administrative boundaries)?', selected 'No, I am a tourist' or 'No, I am a temporary visitor/regular commuter for work, studies, etc.' and, for place of residence, chose 'Other' and entered another city or country (e.g., Riga, Kaunas, Germany, etc.). This group also includes respondents who, in nationally representative resident surveys in Latvia and Lithuania, answered 'Yes' to the question 'Have you visited Liepāja in the last month?'. It includes tourists from Latvia, Lithuania and other countries, such as Estonia, the United States, Germany, the United Kingdom, Sweden, and France.
Unlimited number of trips on public transport	In the context of this study, this term means that, during the validity period of the MaaS plan, the user can make an unlimited number of trips on the public transport modes included in the plan. This unlimited number of trips applies only to the MaaS plan duration chosen by the respondent (for example, one day, three days, one week, etc.) and is not rolled over to the next period, regardless of how many trips were actually made. The MaaS plan duration refers to the full calendar period (for example, two weeks or one month), without distinguishing between weekdays and weekends.
USA	United States of America.
Usage intensity (allowance level)	In the context of this study, this describes the volume of transport services included in the MaaS plan for different plan durations (one day, three days, week, two weeks, month). As different absolute allowance levels were offered for each plan duration, these were transformed in the analysis into comparable usage intensity levels (from low to maximum intensity). For each mode of transport, its own usage intensity scale was defined: four levels for e-scooters, five levels for public transport, taxi and car sharing, and six levels for (e-)bikes. The following usage intensity level descriptions are used in the report: • **Low usage intensity** – the lowest allowance level offered for the given duration (for example, a small number of trips or a small number of kilometres/minutes). • **High usage intensity** – a large allowance level that exceeds low and medium intensity and allows frequent use within the MaaS plan duration. In the analysis of e-scooters, where a four-level intensity scale is used, "high

	intensity" is also the maximum level. In the usage intensity scales for public transport, taxi and car sharing, which have five levels, "high intensity" is the second-highest level, below "very high intensity". In the (e-)bike intensity scale with six levels, "high intensity" is an upper-medium level (level 4 out of 6), below "very high" and "maximum" intensity. • **Very high usage intensity** – a very large allowance level, intended for very frequent use (regular everyday mobility). In the analysis of public transport, taxi and car sharing with five-level intensity scales, "very high intensity" is the highest (maximum) level. In the six-level (e-)bike scale, "very high intensity" is the second-highest level. • **Maximum usage intensity** – the highest possible allowance level, which in this study is defined only in the analysis of (e-)bikes.
WTP	Willingness to pay – the average amount respondents are willing to pay for the changes in the MaaS plan - transport modes included in a MaaS plan and their usage allowances (e.g., number of included public-transport trips; minutes of e-scooter use), as well as the possibility of transferring unused services to the next period.

Executive Summary

The study on mobility as a service in Liepāja was conducted as part of the international INTERREG EUROPE project " Digital solutions for sustainable urban mobility" (*MaaSolutions*), which aimed to analyse the habits of residents of Liepāja city, including regular commuters from South Kurzeme region, and tourists in the choice of modes of mobility and identify the main challenges for the implementation of digital mobility solutions. The research involved empirical data collection, reaching 636 respondents from different groups: residents of Liepāja (46.2%), tourists (46.5%) and regular commuters (7.3%). This balanced distribution of participants allows for a comparison of the differences in the travel habits of these groups.

An analysis of Liepāja's tourism profile shows that the majority of tourists are residents of Liepāja (61%), followed by tourists from Lithuania (34%). The study sample reflects various socio-demographic groups without any one group being particularly dominant. This sample structure allows for a detailed segmentation analysis and reliable results.

The study analyses regular commuters together with residents of Liepāja in the context of mobility and choice of a MaaS plan. The car is the main mode of transport for all respondents (used in 44% of all trips). Public transport accounts for 24% of all trips (bus 16,5%, tram 7,6%), followed by walking – 21%, while micromobility is less popular: (e-)bike use accounts for 4% of all trips, while (e-)scooter use accounts for 2%. Other means of transport are used even less frequently. Residents use cars more often for their daily journeys, while tourists make more active use of micromobility and car sharing services.

The most popular destinations for residents are going to work (39.1%) and shopping (15.4%). The main destinations for tourists are holidays/sightseeing (39.0%) and social/leisure (14.1%). Only 21.4% of tourists travel alone, compared to 78.9% of residents. The peak hours for residents are on the weekday and weekend mornings from 7:00 to 8:59 and on weekday evenings from 17:00 to 17:59. Compared to residents, tourists are more active during a wider time period, on weekdays and weekends from 10:00 to 12:59, as well as during the night hours (01:00–04:59).

Transport expenditure differs significantly between residents and tourists. Low expenditure (up to *€15* per month) is typical for 26.8% of residents and 34.5% of tourists, while high expenditure (over *€81* per month) is observed among 37.9% of tourists and 23.5% of residents.

In addition to differences in transport expenditure, residents and tourists also use mobility-related digital applications differently. Navigation applications (such as *Waze*) are popular with both groups, with around 50% of both residents and tourists using them. However, they use other mobility-related apps differently. Public transport ticket purchasing apps are used more often by residents (51%) than tourists (12%), while parking payment apps are used by 25% of residents and 16% of tourists. Real-time traffic and route planning apps are more popular among residents (19%), while tourists use them less frequently (6%).

The majority of respondents (54%) are unfamiliar with the concept of MaaS, approximately 25% have only a vague idea of what it is, 18% have a moderately good understanding of it, and approximately 4% have a very good understanding of it. Overall, less than a quarter of respondents have a good or moderately good understanding of MaaS.

Respondents most agree that MaaS provides opportunities for different modes of transport (63.7%), increases flexibility in planning (58.2%), helps to use time more efficiently (53.2%) and enhances travel happiness (52.8%). Less support (47.1%) was given to the statement that the introduction of MaaS will reduce environmental impact. It is important to note that 35-43% of respondents choose neutral answers for these benefits (depending on the specific question). This means that respondents are only partially informed or lack practical experience with MaaS.

The choice patterns of residents and tourists when selecting MaaS plans differ both in terms of plan duration and in how frequently such plans are chosen. Residents' choice of MaaS plan duration is almost equally divided between daily plans (39%) and monthly plans (38%). Tourists, on the other hand, choose daily plans (46%) and three-day plans (29%). Tourists consistently prefer MaaS plans at all price points (for example, 28% of tourists choose pre-defined MaaS plans at market price, compared to only 19% of residents).

Users choose self-configured MaaS plans very often, regardless of price. At market price, 91% of tourists and 89% of residents choose their own MaaS plan. Even with a 60% mark-up on the market price, these MaaS plans are still chosen by 86% of tourists and 92% of residents. This clearly shows that people highly value the ability to tailor MaaS plans to their needs.

The transfer of unused service volume to the next period significantly increases the choice of a MaaS plan. If the discount is 60%, 77% of respondents choose to transfer the service volume to their self-configured MaaS plans, but at a 60% mark-up, this figure rises to 92% of respondents. It is important to note that this feature reduces the impact of price on the choice of a MaaS plan. Respondents feel more secure knowing that they will not lose anything.

Respondents (71% of tourists and 68% of residents) are willing to share their own MaaS plans. Most often, they make the choice to share their own MaaS plans with 1-2 other users, such as family members or friends. When travelling alone, price does not significantly influence the choice of a self-created MaaS plan, but when travelling with children, price significantly influences the choice of a MaaS plan. When travelling with children, 71% of respondents choose their own MaaS plan with a 40% discount, but only 48% of respondents choose the market price. Accordingly, this group of users may need additional discounts on MaaS plans.

Public transport plays a key role in mobility planning. Only a small proportion of respondents (6%) would make the choice of a MaaS plan that did not include public transport. In contrast, in most cases (54-71%), the MaaS plans they created included an unlimited number of trips on public transport. MaaS plans that include the use of public transport are also often chosen by respondents who do not use public transport on a daily basis. If the pre-defined MaaS plan provides for an unlimited number of trips on public transport and a discount is applied, the choice of a MaaS plan increases even more (up to ~46% with a 60% discount).

E-scooters are included in 38% of respondent-configured MaaS plans. The price of e-scooters significantly influences users' choices in pre-defined MaaS plans. Approximately 20-24% of respondents choose MaaS plans with high e-scooter usage at market price, but with a 60% discount, 50% of respondents choose them. Thus, e-scooter users are the most price-sensitive segment, where targeted discounts (especially 40–60%) significantly increase the choice of a MaaS plan in the high e-scooter usage group, which accounts for approximately 4% of all respondents.

The use of (e-)bikes is included in the respondent-configured MaaS plans in approximately 60% of cases. The role of (e-)bikes in the MaaS plan is twofold. Firstly, in the pre-defined MaaS plans, the choice depends on both the price and the intensity of use included: in 50% of cases, MaaS plans with maximum (e-)bike usage intensity, and a 60% discount are chosen, while 25% of cases choose low usage intensity (see Figure 5.15 in Appendix 3). This indicates a segment where a higher included (e-)bike volume is attractive precisely at a reduced price. Secondly, in self-configured MaaS plans, an excessively high initial number of minutes does not encourage their selection. On average, 85% of respondents choose such plans if they correspond to the market price, while only 57% choose these plans with a 60% mark-up. However, if the MaaS plan has a lower (e-)bike usage intensity, respondents (71-96%) also choose such plans with mark-ups.

This approach complements the overall mobility system, where the share of micromobility is generally small, but the use of (e-)bikes or e-scooters may potentially increase in self-configured MaaS plans.

Most respondents rarely include taxis (ride-hailing) in their MaaS plans – only about 43% of cases. The study shows that price changes have less influence on choice than user habits and needs. There is a small segment that uses taxis (ride-hailing) frequently and chooses them regardless of price. If a small mileage allowance is offered with a 20% discount (e.g. 10 km for a couple of days or 50 km per month), interest in including taxi (ride-hailing) increases significantly (by around 27 percentage points). Therefore, it is advisable to include small, understandable taxi (ride-hailing) volumes with a 20% discount in MaaS offers, with the option to add more at market price as needed.

Car sharing is rarely included in self-configured MaaS plans – only 14% of respondents choose it with high usage intensity, while more than half (56%) do not include it at all. If the amount of car sharing included in MaaS plan is small, it does not significantly increase interest – the choice of such a plan is made in about 25% of cases, both with a 20% discount and a 60% mark-up. On the other hand, when the intensity of car sharing included in a MaaS plan is high, discounts are a motivating factor – with a 60% discount, a choice of a MaaS plan is made in about 44% of cases. In cases of very high usage intensity, the impact of price becomes minimal (for example, 26% choose a 40% discount, 19% even choose a 60% mark-up). In their own MaaS plans, users most often choose either not to include car sharing (93–94% of cases at market price/mark-up) or to include it immediately at high usage intensity (84–100% regardless of price). At low or medium usage intensity, the choice of a MaaS plan is significantly lower. Overall, this means that demand for car sharing is driven more by user habits and needs than by price. Therefore, it is recommended not to include car sharing in MaaS starter packs and to offer it as an additional option at market price, but if it is included, then immediately at a higher volume, for example, 40 km for three days or 150 km per month.

The random utility model used in the study allowed for a quantitative assessment of what determines the choice of a MaaS plan. The model is based on the assumption that users choose the plan that offers the highest utility, which is made up of several attributes: price, included time or distance, public transport status, subscription duration and the possibility to carry over unused volume.

The calculated model is statistically significant, with a good proportion of explainable data ($R^2 = 0.36$) and accuracy of result classification (74%). The model results reveal that price is the main negative factor

influencing choice, but several other attributes significantly increase the attractiveness of the MaaS plan. The highest rated are:

- 100% rollover of the unused allowance – users are willing to pay an additional €2 per day for the option to roll over to the next period the unused allowance for all mobility services included in the MaaS plan (public transport with a defined allowance level, car sharing, (e-)bikes, e-scooters), except in cases where public transport includes an unlimited number of trips;
- unlimited number of trips on public transport – equivalent willingness to pay (€2 per day) for an unlimited number of trips on the public transport modes included in the MaaS plan over the chosen plan period.
- three-day subscription period – users are willing to pay an extra *€1* per day compared to a one-day plan.

In contrast, MaaS plans with included usage (including a limited number of minutes or kilometres) are perceived as insufficiently valuable and significantly reduce the likelihood of choice. The model results show that such plans reduce willingness to pay by up to *€5.03* per day compared to an equivalent plan with full or flexible usage. Plans with included taxi (ride-hailing) (over 5 km per day) and (e-)bike usage (over 10 minutes per day) are rated as inadequate (too high), and willingness to pay for a MaaS plan decreases by ~0.4 *euros* per day.

The attitude and awareness towards MaaS included in the model show that:

- A more positive attitude among respondents towards MaaS increases the odds of the choice of a MaaS plan by 47%;
- price becomes important as respondents' attitudes improve. If the MaaS plan meets the user's needs, as the study concludes that there is a need for individually tailored plans, this will result in a positive attitude and the purchase of a MaaS plan;
- better awareness of MaaS reduces the importance of an unlimited number of trips on public transport, and users pay more attention to other modes of transport;
- lower awareness of MaaS reduces the odds of plan choice by 31%. This indicates that increasing awareness in less-informed user groups can partly substitute for the financial incentives that would otherwise be needed to encourage the choice of MaaS plans.

These results show that, in addition to the content of the MaaS plan created by the users themselves, it is also important to raise awareness among potential MaaS plan users and foster a positive attitude so that MaaS is not perceived merely as an alternative to public transport ticketing systems. The modelling results confirm that the choice of a MaaS plan is determined by both rational economic factors (price, time, availability) and perception aspects (positive attitude, flexibility, possibility to transfer unused services). These findings point to the need for policy instruments, in particular information campaigns with targeted pricing policies that promote the attractiveness of MaaS and reduce the price perception barrier.

Based on the results of the study and document analysis, recommendations have been prepared to help successfully implement the Mobility as a Service (MaaS) concept in Liepāja. The studies included in the

document analysis show that users are more likely to give up their private cars if they can conveniently combine several modes of transport and use a single integrated ticket. Therefore, it is recommended to improve the regulatory framework – to introduce uniform data and identification standards and to develop a common ticketing system with real-time data exchange between operators. The recommendations offer technical solutions for the creation of a MaaS platform and emphasise the need to clearly divide roles between local government institutions and to allocate resources for IT development, data analytics and coordination of cooperation.

The following recommendations describe the principles for creating MaaS plans. The tables provide specific examples of the number of minutes, kilometres or trips included. It has been proven that users more often choose plans that include an unlimited number of trips on public transport. In order to attract more users, it is recommended to apply targeted discounts and gradually introduce solutions, starting with pilot projects. It is also proposed to create an innovation fund, loyalty programmes and a user engagement platform. Particular attention is paid to data protection, a user-friendly and understandable application, and taking into account the needs of different groups in society, so that the MaaS system is accessible and useful to everyone.

1 Introduction

On 27 June 2025, the Liepāja City Municipality Central Administration concluded Agreement No. 151/2.8.7 on the development of the "Mobility as a Service (MaaS) Concept in the City of Liepāja" (hereinafter referred to as the Study). The Study is being implemented and financed within the framework of the INTERREG EUROPE interregional cooperation programme project "*Digital solutions for sustainable urban mobility*" *(acronym – MaaSolutions)*, No. 02C0616.

1.1 Scope of the Study

The study develops a MaaS concept for the city of Liepāja, based on quantitative research in two target groups: residents and tourists. The geographical scope of the study covers the entire territory of the municipality of Liepāja.

The aim of the study is to determine the mobility habits of residents of Liepāja (young people, students, employed and unemployed persons, seniors, and people with special needs, mobility impairments and disabilities), including regular commuters for work/study/leisure from South Kurzeme region, and tourists; to assess their knowledge of and attitudes towards the MaaS concept; and to identify which MaaS plan attributes most influence their choice and willingness to pay for the services included in the MaaS plan.

The study is structured in five interrelated thematic blocks, which provide an understanding of the potential for MaaS implementation in Liepāja:

- **Analysis of user behaviour:** daily and leisure travel habits, modes of transport used and digital solutions.
- **Attitudes and public awareness regarding MaaS:** awareness, motivation and barriers among different user groups.
- **MaaS plan content and management:** modes of transport to be included (public transport, micromobility, taxi (ride-hailing), car sharing) and their usage, pricing and discount principles.
- **Willingness to pay (WTP):** the impact of price on choice, willingness to pay for the modes of transport included in the MaaS plan and their usage volumes (e.g. for the number of journeys included in public transport, for minutes of e-scooter use), as well as the as for the option to roll over the unused allowance to the next period.
- **Actions and implementation:** recommendations for local government, public transport service providers and users.

During the study, empirical data were collected from 636 respondents, including residents (335 respondents) and tourists (301 respondents).

Limitations of the study

The study focuses on passenger mobility within the administrative boundaries of the city of Liepāja, and therefore does not cover freight transport, sea and air transport, nor does it include a detailed analysis of inter-city transport, except for its direct interaction with local mobility. This study focuses on policy and service design, including surveys, statistical analysis and behavioural econometric models. Therefore, the

development of specific technical solutions should be carried out in the next stages of MaaS implementation.

All data collection and analysis were carried out in a fully anonymised form, which limits the possibilities for longitudinal analysis or tracking individual behavioural changes over time. The study is based on a one-time collection of data over a specific period of time, without providing an analysis of seasonality or long-term trends.

1.2 Structure of the Deliverable

The deliverable consists of a summary report and three annexes. Each part serves a different function: the summary report outlines the main insights, recommendations and conclusions for decision-making, while the annexes provide full traceability – from the questionnaire and data to the details of the methodology and modelling.

Summary Report. This document summarises the key results, conclusions and recommendations of the study. The text is written in clear, uncluttered language, emphasising practically applicable findings and recommendations for policy and implementation. References are provided to the relevant annexes, where the full technical information is available.

Annex A: End user's survey questionnaire (in English, Latvian). The full final version of the questionnaire, with question-display logic and completion instructions. The annex serves as a reference for any interpretation or quality checks.

Annex B: Sample data and screenshots. Raw and restructured data in XLSX format, together with the variable list and the corresponding data dictionary. Also included are screenshots from the survey form *LimeSurvey* platform illustrating the visual layout of questions and the input controls used. The annex ensures full traceability of results, variables and questionnaire content.

Annex C: Detailed study analysis of the research data. An extended description of the methodology and analysis: research design, data processing, complete calculations and graphical outputs, as well as the data modelling section (formulae, assumptions, limitations, and a full set of coefficients). This annex provides the technical justification for the conclusions and recommendations presented in the Summary Report.

Identical documentation has been prepared in Latvian.

Authors of the study

The following expert participated in the development of the study:

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2 Methodology and Sampling

2.1 Research Design

The study uses a quantitative approach: respondents' choices regarding MaaS plans are analysed within the framework of a random utility model using discrete choice models. The analysis is based on two types of choice of a MaaS plan within a single survey: (i) pre-defined MaaS plans with a binary purchase choice (Yes/No) and (ii) a task in which respondents self-configure a MaaS plan; once selections are made, the system displays the total price, and a binary (Yes/No) purchase decision is recorded.

The pre-defined MaaS plans shown to respondents were constructed from mode-specific price and allowance data provided by the methodological partner, the University of the Aegean (Greece). Using these data, a statistically efficient design was generated with specialised software: 45 unique MaaS plans for each period (one day, three days, one week, two weeks, month). The plans were partitioned into 15 blocks of three plans; each respondent was randomly assigned one block (via a random-number generator) to reduce burden and improve data quality. Thus, each questionnaire evaluated three MaaS plans, while the sample as a whole evenly covered all pre-defined plans.

In the user-created MaaS plan task, respondents chose allowances for each mode of transport, taking into consideration the prices shown in brackets for each option. After the selections were made, the system displayed a summary with the total price, and a binary purchase choice (Yes/No) was recorded. Because the price and mode-specific allowance settings followed the methodological partners' definitions, the data from both tasks were analysed in a single dataset.

The main dependent variable is the choice of a binary purchase (Yes/No), therefore, a binary logistic regression (logit) was used for the analysis, with parameters estimated using the maximum likelihood method. Willingness to pay for the services included in the MaaS plan is derived as the ratio between the coefficient of the relevant attribute and the cost coefficient (for linear price specifications). The price is modelled as a piecewise linear function with a breakpoint at ~€40/day. Accordingly, WTP can be interpreted up to this threshold (≤40 €/day), but above it, the impact can be assessed using scenario simulations.

2.2 Data Collection Methods

Data was collected using a self-administered online survey. Participants completed the questionnaire independently, at a time and place convenient for them, using the *LimeSurvey* platform. The survey was available in Latvian and English, and the average completion time was 19 minutes.

The questionnaire used in the study covers the following sections:

- Introduction and classification questions – initial information about respondents;
- Travel diary – information about the previous day (up to six trip entries with start and end times, destinations, modes of transport, accompanying persons, etc.);
- App usage habits and knowledge of MaaS – existing experience and awareness;
- "Choose a MaaS plan" – three predefined MaaS plans with a binary purchase choice (Yes/No);

- "Create your own MaaS plan" – the user configures his/her own plan from the choices available to them, with a price indicated for each choice;
- Attitudes, resources and demographics – attitudes towards MaaS, available means of transport and socio-demographic data.

The survey questionnaire has been locally adapted for Liepāja, while ensuring interregional comparability with other *MaaSolutions* project partners.

The survey was anonymous – no authentication was required, and the system did not store the respondents' IP addresses.

2.3 Sampling Techniques and Sample Size

To ensure full coverage of the target groups, two recruitment channels were used in roughly equal proportions: (1) on-site/public-space recruitment and (2) respondent panels, each at approximately 50%.

- **On-site recruitment via QR codes.** QR codes were placed at multiple locations across the city of Liepāja:
    - in public-transport vehicles (on seat backs in intercity buses, on exit doors in city buses, and on the rear window in trams);
    - in hotel lobbies (some hotels also placed the codes in rooms);
    - in selected food venues more frequently visited by tourists;
    - at the Liepāja Bus Terminal, the Liepāja Region Tourism Information Office, and in educational institutions–RTU Liepāja Academy and the Liepāja Youth House.
- **Residents (respondent panel).** Residents of Liepāja City and the South Kurzeme Municipality were additionally recruited via an online respondent panel. Ineligible respondents were excluded according to screening criteria (data provided by IntraResearch OU).
- **Tourists (respondent panel).** Latvian tourists were reached through a nationally representative online omnibus survey; respondents were asked whether they had visited Liepāja in the past month. Those answering "Yes" were invited to complete the tourist questionnaire (data provided by Norstat Latvija AS).
- **Cross-border respondents (respondent panel).** Residents of Klaipėda and Kaunas (Lithuania) were asked whether they had visited Liepāja in the past month. Those answering "Yes" were invited to complete the tourist questionnaire (data provided by IntraResearch OU).

Combining on-site recruitment with respondent panels in similar proportions enabled the inclusion of harder-to-reach groups and broadened target-group coverage. This approach ensured a sufficient sample size and diversity.

At the end of data collection, 636 fully completed questionnaires were obtained–301 from tourists and 335 from residents. Additionally, the dataset includes 18 questionnaires in which respondents completed all five MaaS plan choice tasks but did not fill in the personal-data section.

2.4 Data Processing and Cleaning

Data processing was organised in such a way as to ensure the accuracy, comparability and repeatability of the survey results. The main steps are outlined below: linking to source data, duplicate checking, cleaning and grouping, harmonising location data, structuring data for analysis and coding, and transforming data for modelling.

Linkage to source data. The data was exported from the survey platform, retaining the original question codes and descriptions. This practice ensures a direct link to the questionnaire, facilitates quality checks and allows the origin of each value to be traced.

Duplicate control. The risk of duplicates was minimised at the time of data collection: a single-session limit was introduced in the QR channel, and each respondent was assigned a unique identifier in the respondent panels. As a result, there was no need to delete duplicates after the data was collected.

Cleaning and grouping. Before analysis, incomplete questionnaires were excluded from the data set. Since the *LimeSurvey* platform provided logical and range checks for entries, it was not necessary to identify entries with format or content violations. Therefore, data processing activities focused on standardisation and recalculation: assigning/standardising variable names; calculation of time units, separating hours and minutes, calculating days of the week, grouping into 24-hour intervals; as well as grouping continuous variables (e.g. age, number of employees, number of vehicles).

Location data harmonisation. Travel diary entries were standardised using both reverse geocoding (from coordinates to address) and geocoding (from free text to coordinates). An administrative hierarchy (country – region – municipality – city/village) and location types (e.g. school, shop, park) were added to the entries, and practical aggregation labels were created at the suburban level.

Structuring data for analysis. The output data was converted into two tables. The first table covers travel behaviour (each stage of the journey – a separate row with times, destinations, modes of transport and fellow travellers), the second covers choice tasks (each scenario or user-created plan – a separate row with attributes, price and purchase choice (0 / 1)). This structure directly links everyday behaviour to MaaS plan choices and, without additional intermediate steps, enables both descriptive and econometric analysis.

Coding and transformation for modelling. The variables required for the models (e.g. prices, minutes and kilometres) were standardised and, where necessary, centred to reduce the risk of linear interdependence (collinearity) between attributes and to ensure a more unambiguous interpretation of the coefficients. Unlimited travel on public transport is coded separately so that it is not misinterpreted as a quantitative volume. The price is modelled as a piecewise linear function (piecewise function) with a breakpoint at €40/day; approximately 13% of plans exceed this threshold. This choice was made to reduce the impact of a few very expensive plans on the assessment of willingness to pay in the more common price range.

These actions have resulted in a high-quality, transparent and auditable data set that links daily travel habits with the choice of a MaaS plan. The data is suitable for both descriptive statistics and discrete choice modelling, and its interpretation is based on clearly traceable, reproducible steps.

3 Descriptive Statistics of Data

3.1 Sample Demographics

The sample consists of 46.2% residents of Liepāja City, 46.5% tourists and 7.3% regular commuters (see Figure 2.1 in Appendix C).

The largest share of residents of the City of Liepāja live in the Old Liepāja and the city centre (29.1%), followed by Ezerkrasts neighbourhood (21.5%) and the South-West neighbourhood (11.6%). Less represented are residents living in the neighbourhoods of Karosta (11.3%), Jaunliepāja (9.9%), the Northern Suburbs (8.3%), Green Grove (*Zaļā birzs*) (4.3%), Tosmare (3.3%) and the New World (*Jaunā pasaule*) (0.7%) (see Figure 2.2 in Appendix C).

Most tourists come from Latvia (61.2%) and Lithuania (33.9%) (see Figure 2.6 in Appendix C). Smaller groups are visitors from Estonia (0.7%), the USA (0.7%), as well as Germany, Great Britain, Sweden and France (each around 0.3%). The category “Other countries” includes Hungary, Norway, Romania, Spain and the Czech Republic.

Women constitute the majority in both target groups: 67.3% of residents and 53.5% of tourists; the total proportion of women in the sample is 60.7%. Men account for 35.8%, while other options (e.g. ‘non-binary’, ‘choose not to answer’, ‘other answer’) together account for less than 4% (see Figure 2.8 in Appendix C).

The age structure of the sample is balanced – the four main age groups (≤30; 31–40; 41–50; ≥51 years) each comprise 20–29% of respondents. Among residents, the largest proportion is in the ≥51 age group (28.0%), while among tourists it is in the 31–40 age group (31.4%) (see Figure 2.9 in Appendix C).

Most respondents have a college/bachelor's degree (31.9% of residents; 27.4% of tourists), followed by a master's degree (27.1% and 26.7%, respectively). Secondary education is indicated by 15–19%, a similar proportion for vocational education, while doctoral degrees account for around 2% in both groups (see Figure 2.11 in Appendix C).

Self-assessment of income differs between target groups: residents more often (23.3%) than tourists (10.2%) state that their income is “much lower than average”. Tourists are more likely to assess their income as "about the same as average " (20.8% vs. 16.5%) and "slightly higher than average" (27.4% vs. 22.1%). The level "much higher than average" is mentioned by about 7-9% of respondents in both groups, while about 17% did not answer the question about income (see Figure 2.14 in Appendix C).

78.5% of respondents have a valid driving licence: 84.2% of tourists and 73.5% of residents (see Figure 2.15 in Appendix C).

The availability of private vehicles in households is high and varies between segments: 84.5% of residents and 92.5% of tourist households have access to a car. Bicycles are available to 86.1% of residents and 82.7% of tourists, while scooters are available to 16.1% and 25.2%, respectively, confirming that the basic means of mobility differ between the groups (see Figure 2.21 in Appendix C).

At least one day a week, 23.9% of residents and 41.3% of tourists work or study remotely. Breakdown by number of days: one day a week remote work – 31.6% of residents and 25.2% of tourists; two days – 20.3% and 30.1% respectively; five days – 13.9% and 16.3% (see Figures 2.16–2.18 in Appendix C).

The most common reason for visiting Liepāja among tourists and regular commuters is leisure/vacation (49.5%), followed by visiting friends or family (17.0%) and business/work-related (16.1%) (see Figure 2.4 in Appendix C).

In the sample, 8.7% of respondents are persons with disabilities, 3.0% are persons with reduced mobility, and 81.5% do not fall into either of these categories (see Figure 2.18 in Appendix C).

Conclusions

The sample is structurally balanced and evenly represents both residents of Liepāja and tourists, ensuring reliable comparisons between groups. The territorial profile of residents is well covered, with an emphasis on the central districts of Liepāja – the largest proportion of respondents lives in Old Liepāja and the city centre (29.1%), followed by Ezerkrasts (21.5%) and the South-West neighbourhood (11.6%). The tourist audience is mainly regional and cross-border (Latvia and Lithuania), and the number of respondents from other countries is small. Therefore, conclusions about tourist needs largely apply to geographically proximate markets. The sample represents various socio-demographic groups without any significant bias towards any of them. Overall, the sample structure is suitable for detailed segmented analysis.

More detailed information on the characteristics of the sample is available in Section 2 of Appendix C (pp. 24–41).

3.2 Travel Patterns

Private cars are the most common mode of transport in Liepāja, accounting for 44% of all journeys (see Figure 3.1 in Appendix C). Public transport is mentioned in 24% of cases: bus – 16,5% and tram – 7,6%. Walking ranks third (21%). Micromobility modes account for a small share: (e-)bike – 4% and (e-)scooter – 2%. Even less frequently used are taxi (ride-hailing) (2%), car sharing (1%) and motorcycles/motor scooters (1%). Other modes of transport are used even less frequently. Overall, private car travel dominates, followed by public transport and walking.

Of all survey respondents who use a car as their mode of transport, 56% are residents and 44% are tourists. Residents also use public transport more actively: 66% of bus users and 57% of tram users are residents. (E-)bikes are also mainly used by residents (73% of all (e-)bike users) (see Figure 3.1 in Appendix C). Tourists, on the other hand, more often choose micromobility and rental vehicles: 60% of (e-)scooter users, 71% of car sharing service users and 77% of taxi (ride-hailing) users are tourists.

Among residents, car sharing service users opt for the widest variety of transport modes (4.0 modes on average). Slightly less diversity is characteristic of users of taxi (ride-hailing), (e-)scooters and private cars, as well as groups of pedestrians (approximately 3.0–3.6 modes) (see Figure 3.2 in Appendix C). Bus and tram users, on the other hand, use an average of 2.8 different modes of transport, while for (e-)bike users this figure drops to 2.6. Among tourists, the most diverse modes of transport are used by tram and car sharing service users (3.5–3.7 modes). In turn, (e-)scooter and (e-)bike users opt for an average of 2.6 and 2.4 different modes of transport.

On weekdays, residents travel most between 7:00 a.m. and 8:59 a.m. and between 5:00 p.m. and 5:59 p.m., with minimal travel at night (see Figure 3.9 in Appendix C). For tourists, weekday travel is heaviest from around 10:00–13:59, and–unlike residents–they travel more at night (see Figure 3.10 in Annex C). At weekends, residents' travel patterns flatten out, though the morning peaks remain. Tourists' travel is particularly high between 10:00–16:00 (see Figures 3.9 and 3.10 in Annex C).

Car use dominates throughout the day, especially during the morning and evening peaks. Buses are used more often in the early morning (up to 08:15), while the share of tram use increases around lunchtime (12:15–14:15) (see Figure 3.11 in Annex C). Walking rises from 15% (08:30–10:00) to 31% (18:30–23:45). Micromobility remains in the 6–9% range, with (e-)bikes used more often than (e-)scooters.

Residents mainly travel for work (39%) and shopping (15%). Tourists' main travel purpose is holidays/sightseeing (39%), followed by social/leisure (14%), shopping (12%) and family-related trips (11%) (see Figure 3.5 in Appendix C). Most residents travel alone (78.9%), whereas only 21.4% of tourists do so. Tourists more often travel with a spouse/partner (44.7%) or with children (30.0%) (see Figure 3.6 in Annex C).

Private cars are the dominant mode of transport for almost all trip purposes (34–50%), especially for trips to work (50%), to educational institutions (48%) and family trips (47%) (see Figure 3.8 in Appendix C). Walking is the second most popular choice for holidays/sightseeing (31%), social/leisure (28%) and shopping (22%). Public transport is chosen for trips to educational institutions (39%), Exercise/workout (31%), as well as for getting to and from work (25% and 30% respectively). Micromobility – (e-)bikes and (e-)scooters – is more often used for social/leisure (12%), exercise/workout (8%) and commuting to work (7%). Car sharing is most often used for social/leisure (3%).

On weekdays, residents' journeys between 6:00 a.m. and 6:59 p.m. last 12-20 minutes on average, but at weekends, they take longer at lunchtime/in the afternoon (23-25 minutes on average). The duration of tourist travel is longer and more variable: on weekdays, it exceeds 20 minutes in 14 out of 24 hours, but on weekend afternoons it reaches approximately 32 minutes (between 17:00 and 17:59) (see Figures 3.15 and 3.16 in Appendix C).

Both residents and tourists most often use navigation apps[2] (e.g. Google Maps, Waze), with approximately 50% in each group (see Figure 4.1 in Appendix C). Public transport information/ticket purchase apps (including the "Liepājas pilsēta" app) are used by 51% of residents and 12% of tourists. Parking payment apps (e.g. Mobilly) are used by 25% of residents and 16% of tourists. Real-time traffic/route planning tools (including the "Liepājas pilsēta" app) are used by 19% of residents and 6% of tourists, while taxi (ride-hailing) mobile apps (e.g. Bolt Taxi, TAXI Liepāja, Taxi Tesla, etc.) are used by 18% of residents and 13% of tourists. Tourists use taxi booking apps slightly more often than residents (19% vs. 12%). Car sharing apps (e.g. CityBee, Bolt) are used by 15% of tourists and 11% of residents. Micromobility apps are used by few in both groups (≤ 6%) (see Figure 4.1 in Appendix C). Apps that offer on-demand travel booking (e.g. minibus, intercity/international bus, train) are used by 13% of respondents in both groups. Meanwhile, 19% do not use any mobility-related apps at all.

[2] In the survey, respondents indicated the app-based services they use for everyday travel.

Residents use public transport passes more often: bus passes – 25% of residents and 19% of tourists, tram passes – 16% of residents and 11% of tourists. The purchase of individual tickets is also more common among residents (20%) than tourists (14%) (see Figure 4.2 in Appendix C). Tourists are more likely to rely solely on private transport: 41% of tourists and 33% of residents. Tourists also use car sharing subscriptions more often (12% of tourists and 3% of residents), as well as subscription plans for shared (e-)bikes and e-scooters – 4% of tourists and around 2% of residents (for both types).

Monthly transport expenditure is unevenly distributed. Low expenditure (≤ €15 per month) is typical for 26.8% of residents and 34.5% of tourists (see Figure 2.24 in Appendix C). Medium transport expenditure (€16–30) is typical for 23.2% of residents and 20.7% of tourists. The €31–80 per month expenditure range is significantly more common among residents (26.5%) than tourists (6.9%). High expenditure (≥ €81) is significantly more common among tourists (37.9%) than residents (23.5%). These data indicate that tourist spending is more often concentrated at the extremes – very low or very high expenditure.

Conclusions

In the city of Liepāja, most trips are made by motorised means of transport: private cars account for 44% of all trips, public transport accounts for 25% (buses 17%, tram 8%). Walking accounts for 21%. The share of micromobility is small – (e-)bikes 4% and (e-)scooters 2%. Taxi (ride-hailing) is used in 2% of trips, while car sharing and motorcycles/mopeds each account for 1% of trips.

Residents use cars, buses, trams and (e-)bikes more: 66% of bus users and 57% of tram users are residents. Tourists, on the other hand, more often choose micromobility, taxis (ride-hailing) and car sharing: 60% of (e-)scooter users, 77% of taxi (ride-hailing) users and 71% of car sharing service users are tourists.

Multimodality, or the use of multiple modes of transport, is more common among car sharing and taxi (ride-hailing) service users (3.5–4.0 different modes on average). The taxi, (e-)scooter, private car and pedestrian groups also have relatively high multimodality (approximately 3.0–3.6 modes). On the other hand, those who rely mainly on one mode of public transport or (e-)bike have lower multimodality (on average 2.4–2.8 modes on average).

Mobility patterns vary considerably between groups. For residents, peak hours are from 07:00 to 08:59 and from 17:00 to 17:59, while for tourists they are in the middle of the day on weekdays (around 10:00 – 13:59) and a wider interval from 10:00 to 16:00 on weekends. Tourists travel at night more frequently than residents. These differences in travel habits indicate that MaaS offerings must be tailored both by profile (residents/tourists) and by time of day, distinguishing between weekdays and weekends.

More information on travel habits is available in Section 3 of Annex C (pp. 42–68).

3.3 Attitudes and Perception towards Mobility as a Service (MaaS)

More than half of respondents (54%) are unfamiliar with the concept of MaaS. 23% are only slightly familiar with it, 18% of respondents are moderately familiar with the concept, while approximately 4% are very familiar with it. The differences between tourists and residents are minor (see Figure 4.3 in Appendix C). Among respondents who are familiar with the concept of MaaS, 40% of residents and 34% of tourists have used this service in their city, while 37% of residents and 33% of tourists have never used

it. The remaining respondents either did not remember or gave a different answer (see Figure 4.4 in Appendix C).

Most respondents agree with the statements that MaaS provides a wider choice of modes of transport (63.7%) and offers more flexible travel planning (58.2%) (see Figure 4.6 in Appendix C). More than half of respondents agree that MaaS could enhance their travel happiness and help them use their time more efficiently (52.8 %) and (53.2 %). Between 45% and 47% agree with the statements that MaaS could improve accessibility, increase overall productivity or reduce the travel time of daily trips. The statement that MaaS would reduce transportation environmental footprint is agreed with by 47.1% of respondents, while 39% take a neutral position. Overall, the proportion of neutral responses to various statements ranges from 26% to 43%.

Most respondents are willing to use MaaS if it reduces the time spent on daily trips (59.1%), reduces monthly costs (56.0%) and ensures safe travel (55.0%) (see Figure 4.7 in Appendix C).

With regard to the duration of the MaaS plan, residents' choices are almost equally split: 39% choose daily plans, while 38% choose monthly plans. This reflects the need to balance plan flexibility with residents' everyday mobility needs (see Figure 4.5 in Appendix C). Tourists prefer shorter-duration MaaS plans – most often daily plans (46%) and three-day plans (29%), and less often weekly plans (17%).

On average (from pre-defined and self-configured MaaS plans), 65.5% of tourists and 55.3% of residents choose MaaS with a 60% discount. With a 40% discount, 64.6% of tourists and 47.4% of residents choose it, while at market price – 52.8% of tourists and 38.5% of residents (see Figure 5.1 in Appendix C). Tourists' choice of MaaS plans with 40% and 60% discounts does not change significantly (65-66%), while residents choose plans with 20% and 40% discounts in similar proportions (47%). At a 60% mark-up, the choice decreases significantly – on average, 34% of tourists and 35% of residents choose a MaaS plan[3].

Respondents who do not use services available in mobile applications choose a MaaS plan less frequently on average (47% for a 60% discount and 44% for a 40% discount) (see Figure 5.3 in Appendix C). Respondents who use apps that allow them to book a ride on demand (e.g., shuttle bus, intercity/international bus, train) choose MaaS more often on average, regardless of price (76% at a 60% discount, 53% at market price, 43% at a 60% mark-up). Respondents who use taxi booking services also choose MaaS plans relatively more often: with a 60% discount, 65% choose a MaaS plan; at the market price, 49% choose it; and with a 60% mark-up, 43% do so. Respondents who use micro-mobility sharing services are particularly responsive to discounts (with a 60% discount, 81% choose the MaaS plan on average, with a 40% discount – 77%, with a 20% discount – 44%), but if the plan has a 20-40% mark-up, the choice remains similar to that of other groups.

Among respondents who have a subscription for shared e-scooters and (e-)bikes, 83–92% choose a MaaS plan with a 60% discount (depending on the vehicle type), whereas respondents who use only private cars or book each trip separately choose MaaS plans with such a discount in only 56–61% of cases (see Figure 5.4 in Appendix C). 60% of respondents who have e-scooter sharing subscriptions choose a MaaS plan

[3] Here and below, the phrase 'on average chooses' describes the choice of a MaaS plan from the pre-defined and self-configured MaaS plans.

even with a 60% mark-up. This indicates that the combination of e-scooters with other modes of transport is highly valued by this target group.

Respondents more often choose pre-defined MaaS plans at market prices if they include public transport: plans without public transport are chosen in 23% of cases, but with high public transport intensity, the choice of a MaaS plan reaches 30% of cases (see Figure 5.13 in Appendix C). Respondents most often choose pre-defined MaaS plans with an unlimited number of trips on public transport and large discounts: in 46% of cases, respondents choose such plans with a 60% discount; while 32-33% choose plans with a 20% discount or a 40% mark-up. If public transport is not included in the plan, respondents' choice is less dependent on price: with a 20% discount, in line with market price and with a 20% mark-up, the choice of pre-defined MaaS plans is similar (~21-25%). Overall, the more public transport trips are included in the plan, the more likely people are to choose it across different price levels. Self-configured MaaS plans that provide for an unlimited number of trips on public transport (very high public transport usage intensity) are chosen by 55–71% of respondents, including those who do not use public transport on a daily basis (see Figure 5.41 in Appendix C. Only 6% of all plans created by respondents do not include public transport (see Figure 5.21 in Appendix C). This highlights the importance of public transport in the MaaS plan offer.

In the pre-defined MaaS plans, the market price selection share is similar (approximately 20–24%) regardless of the amount of e-scooter usage. However, if a 60% discount is applied to the pre-defined MaaS plans, plans with high e-scooter usage are chosen in 50% of cases, while those with low usage are chosen in only 37% of cases. (See Figure 5.14 in Appendix C). If the respondent has included high-intensity e-scooter usage in their self-configurated plan, then 67% choose their own MaaS plan at market price or with a 20% mark-up, but with a 20% discount, 89-91% choose their own MaaS plan (see Figure 5.22 in Appendix C). Accordingly, the choice of a MaaS plan is highly dependent on price. If a respondent has included the use of an e-scooter for safety (at low usage intensity) in their plan, they are less likely to choose such a MaaS plan themselves – if there are discounts, 73–78% choose it. Overall, 62% of all self-configured MaaS plans do not include e-scooters, and less than 4% of respondent-configured MaaS plans include high-intensity use of e-scooters.

The pre-defined MaaS plans with maximum (e-)bike usage intensity are chosen in 50% of cases with a 60% discount, while those with low usage intensity are chosen in 25% of cases. Overall, respondents choose pre-defined MaaS plans more often if they include low or medium usage intensity (e-)bike usage. If pre-defined MaaS plans with very high (e-)bike usage levels have a mark-up of 20% to 60%, the choice of a MaaS plan in these price categories changes by only 3 percentage points (see Figure 5.15 in Appendix C). This indicates that (e-)bike has a loyal user group whose MaaS plan choice is not dependent on price. If the respondent has included (e-)bike use at a high, very high or maximum usage intensity in their self-configured MaaS plan, this leads to a higher rejection rate for the plan: at market price, such self-configurated plans are chosen by an average of 85%, but with a 60% mark-up – only 57% (see Figure 5.23 in Appendix C). On the other hand, self-configured MaaS plans with a lower usage level of (e-)bike are chosen by 90–100% at market price, but only by 71– 96% with a 60% mark-up. Thus, a high initial number of (e-)bike minutes included (this option was initially selected in 12% of cases) deters users from the choice of a MaaS plan, even if the potential user has included them. The use of (e-)bikes is not included in self-created MaaS plans in only 40% of cases.

The choice of the pre-defined MaaS plans varies depending on the presence of ride-hailing (taxi) in the plan: at market price, the choice of such plans varies between ~20–30, but with discounts/mark-up, the choice reaction is very different (see Figure 5.16 in Appendix C). In a situation where taxis (ride-hailing) are included at a very high usage rate, 25% make the choice of such a plan at a 60% discount, but with a 60% mark-up, 19% also choose it. This indicates that there is a niche segment (around 20%) for whom high usage of taxi (ride-hailing) is valuable, even despite the cost per kilometre. When evaluating the entire price range, the pre-defined MaaS plans are most often chosen if they include a small number of kilometres for taxi (ride-hailing) rides. A moderate price reduction of up to 20% in such plans increases the choice by ~27 percentage points. If the respondent has included a high or very high level of taxi (ride-hailing) use in their self-configured MaaS plan, then 76% of cases choose such a plan at market price, but 88% of cases choose it with a 60% mark-up. If the self-configured MaaS plans include a taxi (ride-hailing) with a lower usage intensity, then 86-95% of respondents choose it at market price, but 86-91% choose it with a 60% mark-up. Thus, overall, the demand for taxi (ride-hailing) is not so much dependent on price as on the audience that chooses this mode of transport. Initially, a large volume of taxi (ride-hailing) services is chosen in approximately 11% of cases, and taxi (ride-hailing) services are not included in 57% of cases in the self-configured MaaS plans (see Figure 5.24 in Appendix C).

The choice of the pre-defined MaaS plan with a low car sharing usage level is independent of price: with a 20% discount, such plans are chosen in 25% of cases, and with a 60% mark-up in 24% of cases (see Figure 5.17 in Appendix C). In addition, the choice of a pre-defined MaaS plan with high car sharing intensity increases with discounts (for example, such plans are chosen in 44% of cases if the plan has a 60% discount). However, the choice of a pre-defined MaaS plan with very high car sharing intensity remains unchanged regardless of price: 26% of respondents choose such a plan with a 40% discount and 19% with a 60% mark-up (see Figure 5.17 in Appendix C). Respondents are more likely to choose self-configurated MaaS plans if car sharing is not included (93–94% at market price or with any of the surcharges – 20%, 40% or 60%) or is included, assuming high car sharing usage intensity (such plans are chosen by 83–100% at market price and with any of the surcharges – 20%, 40% or 60%). On the other hand, if car sharing is included in the self-configured MaaS plan at a low or medium usage level, users are more likely to reconsider their initial choice and reject such a MaaS plan (see Figure 5.25 in Appendix C). Thus, the demand for car sharing is not so much dependent on price as on the audience that chooses this mode of transport. Car sharing is included in 14% of cases at a high intensity in the MaaS plan, and car sharing is not included at all in 56% of cases.

In situations where the pre-defined MaaS plans include the option to rollover 50-100% of unused allowance to the next period, the choice of such plans increases to 32-40% if the plans offer at least a 40% discount. If the price is at least 20% lower than the market price, respondents' choice to carry over 50% and 100% of the rollover of unused allowance does not differ significantly. However, respondents more often make the choice to 100% rollover of unused allowance (see Figure 5.18 in Appendix C). In the self-configurated MaaS plans, the rollover of 100% of the unused allowance becomes a significant factor determining the price differences in the MaaS plan: respondents choose such plans in 77% of cases with a 60% discount, and the choice of a MaaS plan increases to 92% if they have a 60% mark-up (see Figure 5.26 in Appendix C).

Residents who fully agree with statements about personal benefits (accessibility, productivity, time savings, satisfaction) choose MaaS plans in 54–57% of cases on average. If residents disagree with these statements, their choice drops to 30–43%. Thus, personal benefits from using MaaS motivate residents to choose MaaS plans more than the public benefits that MaaS can provide (see Figure 5.37 in Appendix C). On average, 51–52% of residents choose MaaS plans because of safer travel or daily time savings, while in cases where the motivation is mainly financial savings, residents make a choice–46% choose these plans (see Figure 5.38 in Appendix C).

The impact of attitude differs among tourists: tourists who completely disagree with the statement about better accessibility choose the MaaS plan even more often (58%) than tourists who completely agree with this statement (56%). In the case of other statements, MaaS is chosen more often by tourists who completely agree with the statements than by those who completely disagree, with differences between these groups of around 4–8 percentage points (see Figures 5.39–5.40 in Appendix C).

Awareness of MaaS influences respondents' choices at all price levels, especially when there is a mark-up. For example, a MaaS plan with a 60% mark-up is the choice of 77% of respondents who are very well informed about MaaS and only 28% of respondents who are not informed about MaaS (see Figure 5.5 in Appendix C).

Respondent with monthly transport expenses exceeding €81 most often chooses a MaaS plan if it offers a 60% discount (70.2% of cases), but as the price increases, the average MaaS plan choice decreases and remains relatively stable in the range from a 40% discount to a 60% mark-up (42–40%) (see Figure 5.2 in Appendix C). Respondents whose monthly transport expenses do not exceed €30 are less interested in MaaS plans (they are chosen in approximately 42–59% of cases). If monthly transport expenses are €16–30, the average choice of a MaaS plan remains within the range of 42–47% up to a 40% mark-up, but if the mark-up is 60%, the average choice decreases to 29%.

Conclusions

Most residents and tourists are not sufficiently informed about MaaS: 54% of respondents are unfamiliar with the concept, only 18% describe themselves as "moderately informed", and around 4% as "very well informed". The differences between residents and tourists in this regard are minor. **This indicates that there is a need for common, clear communication focused on user needs.**

Even among those who have heard of MaaS, 33–37% have not used MaaS services. **This shows that awareness does not always translate into actual use of the service – examples are needed to raise awareness of its use in specific situations. Getting started should be simple: understandable registration procedures, easy-to-understand price offers and the opportunity to try out the service for a short period.**

The benefits that users see are practical: most respondents agree with the statements that MaaS provides multiple travel mode options (63.7%) and offers flexibility in planning and executing trips (58.2%). More than half of respondents see the potential of MaaS to enhance travel happiness (52.8%) and allow them to use their time more effectively (53.2%). Meanwhile, 45–47% recognise the benefits of MaaS in terms of accessibility, overall productivity and travel time for daily journeys. **These figures reveal that users primarily associate the value of MaaS with the freedom of choice and satisfaction it provides.**

Environmental considerations are not yet the main driver: 47.1% agree with the statement that MaaS would reduce transportation environmental footprint, while 35-43% give neutral responses in almost all assessments. **The high proportion of neutral responses indicates uncertainty and a lack of information – users need specific explanations of how MaaS will affect their daily lives in practical terms (e.g. ease of transfer, change of mode of transport, risk of delays, app performance on real routes).**

When introducing MaaS, the first task is to reduce respondents' neutral attitude and turn it into an informed choice: clearly show how MaaS provides flexibility and the ability to adapt to the situation, which overall saves time and ensures predictable and safe travel. Since the level of awareness and initial experience among both residents and tourists is similar, **it is useful to prepare a single basic message with slight nuances that differ for residents and tourists (e.g. short-term plans for tourists and daily route solutions for residents).**

In the tourist group, respondents choose MaaS plans with both a 40% and 60% discount equally often (approximately 65-66%). Residents choose MaaS plans similarly, regardless of whether they have a 20% or 40% discount (in both situations, they are chosen in 47% of cases). This indicates that very large discounts are not necessary, even during the MaaS service implementation phase. Digital readiness, or previous use of other mobility-related apps, has a significant impact on the choice of a MaaS plan: respondents who already use other mobility-related mobile apps choose MaaS more often at all price levels, while those who do not use such applications choose MaaS significantly less often. Respondents who use micromobility applications are more likely to choose MaaS if its price is lower than the market price. **Therefore, pricing policy should be segmented or divided according to the needs of different users, with discounts having the maximum effect on current users of apps and micromobility services. Meanwhile, for others, a simple and reliable demonstration of value is more important than a discount.**

Among respondents who have active (e-)scooter and (e-)bike sharing subscriptions, 83–92% make the choice of their own MaaS plan if it comes with a 60% discount. A significant proportion (56–60%) of respondents with (e)scooter subscriptions would choose their own MaaS plan even with a 60% mark-up. In contrast, respondents who prefer private transport or purchase each trip separately do not choose MaaS offers as frequently. **Therefore, offers tailored to existing micromobility subscription users, such as the option to add public transport and carry over 100% of unused micromobility minutes to the next period, will be well received.**

If public transport is included in the pre-defined MaaS plans, this significantly increases the choice of a MaaS plan at market prices (up to 30% in the case of high public transport usage intensity). If the pre-defined MaaS plan – regardless of its duration (one day, three days, one week, two weeks or one month) – includes an unlimited number of trips on public transport and a discount is applied, its choice increases even more (up to around 46% with a 60% discount). In self-configured MaaS plans, unlimited number of trips on public transport is chosen in 54-71% of cases, and only a small proportion of plans (around 6%) do not include public transport at all. Plans involving the use of public transport are also often chosen by respondents who do not use public transport on a daily basis. This confirms that risk reduction and a sense of security are important to respondents. **Therefore, public transport should be an integral part of all MaaS plans. Other modes of mobility should have clearly defined profiles (micromobility, taxi (ride-hailing), car- -sharing), avoiding unclear levels of vehicle use, especially at medium usage intensity:**

- **E-scooters.** At the market price, the included e-scooter allowance in a MaaS plan does not affect respondents' choice of a MaaS plan; however, at large discounts respondents more often choose plans with larger e-scooter allowances. E-scooter users form a small but very price-sensitive segment in which targeted discounts (especially 40–60%) substantially increase the choice of a MaaS plan in high-usage groups (this group is about 4% of all respondents). Linking these findings to the study's allowance levels–3-day plans (0/30/60/90 min) and monthly plans (0/90/180/240 min)– MaaS starter bundles with an e-scooter option shall include the smallest allowance: 30 min for the 3-day plan and 90 min for the monthly plan; in addition, offer high-usage packs (3-day: 90 min; monthly: 240 min) at a 40% discount and without rollover of the unused allowance to the next period. In both cases, ensure the option to purchase additional e-scooter allowance at the market price.
- **(E-)bikes.** This mode has a resilient, loyal user base whose choice is less price-dependent. At a 60% discount, maximum-allowance bundles are chosen by about 50% of respondents, while in pre-defined plans with a very high (e-)bike usage level, the choice between a 20% discount and a 60% mark-up changes by only ~3 percentage points. In self-configured MaaS plans, overly large initially selected (e-)bike minutes at a 60% mark-up sharply reduce the choice of a MaaS plan (from 85% to 57%). Therefore, in MaaS starter bundles, a low or medium (e-)bike allowance at the market price shall be included, with additional usage available through top-ups, also at the market price. Time bounds can follow the study's levels: 3-day plan – 0/30/60/120/180/240 min; monthly plan – 0/180/360/600/960/1200 min. In the initial MaaS plan, set (e-)bike availability at 30 or 60 min (3-day) and 180 or 360 minutes (monthly), with larger allowances offered as add-ons.
- **Taxis.** Demand for taxi services in a MaaS plan is driven mainly by the audience, not the price. A niche segment (≈20%) values high included taxi kilometres, even at a 60% mark-up. In the general case, the largest gain arises with a small included allowance–a 20% discount increases the choice of a MaaS plan by ~27 percentage points. Accordingly, the starter bundle should include a small initial kilometre allowance with a 20% discount, while additional kilometres are offered as separate add-on packs at the market price. As a reference, use the study's distance values: 3-day plan – 0/10/20/40/60 km; monthly plan – 0/50/100/150/200 km. Thus, MaaS starter bundles shall include a 10 km allowance for 3-day plans or 50 km for monthly plans, each offered with a 20% discount, and offer possible add-ons (20/40/60 km for 3-day and 100/150/200 km for monthly) at the market price.
- **Car sharing.** A small included car sharing allowance in a MaaS plan generally does not increase the choice of a MaaS plan and is not sensitive to discounts, whereas for a high car sharing allowance discounts help (e.g., with a 60% discount, pre-defined MaaS plans with a high car sharing allowance are chosen in ~44% of cases). The choice of very high allowances is almost unchanged regardless of price. In starter bundles, car sharing can be excluded or offered solely as a separate add-on at the market price. As a reference, use the study's values (3-day – 0/10/20/40/60 km; monthly – 0/50/100/150/200 km). In MaaS plans with an included car sharing profile, it is possible to include a high car sharing allowance from the outset–40 km for the 3-day

plan and 150 km for the monthly plan. If a discount can be offered, this may promote switching from private car use to car sharing.

MaaS plans that include 100% rollover are chosen more often already at a 40% discount. If the price is at least 20% below the market price, 50% and 100% rollover are chosen similarly, yet respondents more often prefer 100% rollover. In self-configured MaaS plans, 100% rollover becomes a pronounced driver of price differences–the choice of a MaaS plan remains very high both at large discounts and at mark-ups. **It is recommended to set 100% rollover of unused allowance as the default option when no discounts are offered, or grant it as a special add-on for higher-priced plans (e.g., a monthly plan with a high car sharing allowance).**

From the above, the main principles for MaaS plan assembly are:

1. Include an unlimited number of trips on public transport in all MaaS plans for the entire duration of the given plan (one day, three days, etc.). The price of this service should correspond to the current public transport fare.
2. Differentiate micromobility: for e-scooters, provide a small starting allowance and targeted 40% discounts with clear add-ons; for (e-)bikes, provide a low or medium starting allowance with flexible top-ups, avoiding very large initial allowances.
3. For taxis, include a small kilometre allowance in starter bundles with a 20% discount; additional kilometres should be purchasable as separate add-ons at the market price.
4. Car sharing is not recommended in starter bundles; offer it immediately at a high allowance at the market price.
5. Offer 100% rollover of the unused allowance as a safety/value feature when the user chooses a plan for a week or longer with a high usage level for a specific mode (e.g., taxi or car sharing).

For users with conservative mobility habits–those who use only one or two transport modes included in the MaaS plan–a new transport mode can be introduced with an initial 20% discount. If it is not selected, the discount can be increased to 40%. However, higher discounts are not necessary, as they are unlikely to significantly increase the number of users choosing that particular mode of transport.

More information on awareness of MaaS, attitudes towards it, and the choice of a MaaS plan is available in Sections 4 and 5 of Annex C (pp. 69-130).

An additional cluster analysis was performed, grouping respondents according to the mobility plans they created. The analysis assessed how users themselves put together mobility plans at different prices and levels of transport service use. Detailed results, analysis and recommendations are provided in Section C 5.8 of the Annex (pp. 131–166).

4 Modelling Results

4.1 Model Specification

The data analysis uses a random utility model, which is a widely used method in choice modelling in economics and mobility studies. The model is based on the assumption that users choose the MaaS plan that provides them with the greatest utility.

Utility is expressed as a linear function of the combination of various MaaS plan attributes. Each attribute – cost, number of minutes included, kilometres travelled, subscription period, public transport status or the option to carry over unused volume to the next period – influences the overall utility with its own weight. UtilityV_{ij} is calculated as the weighted sum of the following attributes:

$$V_{ij} = \beta_1 \cdot \text{Costs}_{ij} + \beta_2 \cdot \text{Minutes}_{ij} + \beta_3 \cdot \text{Kilometres}_{ij} + \beta_4 \cdot \text{Period}_{ij} + \beta_5 \cdot \text{Public transport}_{ij} + \beta_6 \cdot \text{Rollover}_{ij}.$$

Here, each coefficientβ_k indicates the extent and direction (positive or negative) in which a particular attribute influences an individual's choice. For example:

- if$\beta_1 < 0$, then higher costs reduce utility and thus the probability of choice;
- if$\beta_2 > 0$, then more minutes included increase the attractiveness of the plan;
- if$\beta_6 > 0$, then the possibility of transferring unused volume is considered a valuable advantage.

All variables included in the model are recalculated on a daily basis, but costs (euros per day) are centred around the average. This is done so that the calculation results can express the impact of each attribute on utility in €/day – how much €/day this attribute increases the utility of the MaaS plan or what discount €/day should be applied so that the utility of the MaaS plan remains unchanged. The main variables included in the model and their transformations are listed below.

- **Costs per day**, centred around an average of €17.6 per day and divided by 10; 1 unit = €10 per day.
- **E-scooter and (e-)bike usage time** in minutes per day, divided by 10; 1 unit = 10 minutes per day.
- **Kilometres travelled by taxi (ride-hailing) and car sharing** per day, divided by 5; 1 unit = 5 km per day.
- **Number of trips on public transport per day** (0 if public transport is not included or the number of trips is unlimited; otherwise, the number of trips during the period divided by the number of days in the period).
- **MaaS plan subscription period**, coded with dummy variables (base – daily plan): three-day plan, weekly plan, two-week plan, monthly plan.
- **Public transport offer**: expressed by two dummy variables: limited and unlimited number of trips; base – plan without public transport.
- **Rules for carrying over rollover of unused allowance** expressed by two dummy variables: 50% carry-over and 100% carry-over; base – plan without rollover of unused allowance. These

variables are only included if a specific number of trips, minutes or kilometres is specified for a particular mode of transport.

- **Attitudes and awareness of MaaS indicators:** standardised attitude factor obtained by principal component analysis and standardised awareness of MaaS (higher value means lower awareness). To test whether attitudes and awareness modify the impact of price and public transport, interaction terms between price and attitude towards MaaS, as well as between an unlimited number of trips on public transport and awareness of MaaS, are also included.

To correct for extreme price values and facilitate interpretation, a piecewise linear function was used for very high prices: 1 unit = €10 per day above €40 per day.

The choice of scale and centres (price centring around the average) stabilises the assessment of parameters, reduces the mathematical dependence between parameters and allows the calculation of willingness to pay in euros per day. Period-derived dummy variables allow for the separation of non-linear 'convenience' effects (the attractiveness of shorter or longer subscriptions), while public transport status and number of trips separate the effect of service quality from the intensity of use. This specification allows us to interpret the coefficients as the impact of cost, time or kilometres on the probability of the plan's choice and to calculate willingness to pay (WTP) for specific attributes, taking into account the scale used.

The SPSS procedure NOMREG was used in the model calculation. Since the dependent variable has two values – "I choose the scenario" (1) and "I do not choose the scenario" (0) – the calculation is reduced to binary logistic regression. The base category is "I do not choose the scenario". The sign of the coefficient indicates whether the plan attribute increases (+) or decreases (−) the attractiveness of the Maas plan. Confidence intervals were obtained using non-parametric bootstrapping with 1000 repetitions, taking into account that each respondent solved several tasks.

4.2 Model Estimation Results

Two models were analysed and compared in the study.

1. The base model, which includes only the attributes of the plan: price, included volume (minutes/km), plan duration, public transport status and transfer of unused service volume.
2. The extended model – the base model + attitude towards MaaS and awareness of MaaS, as well as their interaction with price and an unlimited number of trips on public transport.

Both models were evaluated using the maximum likelihood method and assessed according to standardised quality criteria.

- The extended model improves the explanatory power (McFadden's pseudo $R^2 \approx 0.230$, Nagelkerke's pseudo $R^2 \approx 0.364$) compared to the base model (0.169 and 0.278, respectively). The improvement exceeds the 0.2 threshold, which is considered good for models of discrete choice in the literature.
- Both models are statistically significant ($\chi^2 = 730.410$; $df = 16$; $p < 0.001$ – baseline model; $\chi^2 = 972.216$; $df = 37$; $p < 0.001$ – extended model), i.e., the included variables significantly improve the amount of data explained by the model.

- Both models show good discrimination power, according to the criteria accepted in the literature. The classification accuracy of the base model is 71.6%; the accuracy of the extended model increases to 73.9%, with a particular improvement in sensitivity (recognition of positive cases).

The extended model better predicts choice and is more suitable for price/attribute simulations and willingness to pay (WTP) calculations. The coefficients analysed below are based on this model.

The model coefficients are characterised by the regression coefficient (β), its exponential value Exp(β) and statistical significance (p-value). A negative β reduces the choice of a MaaS plan; a positive β increases it. Statistical significance is indicated by asterisks: *** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$.

Attribute	Coefficients (β, Exp(β), significance)	Interpretation of results and their application
Cost per day; 1 unit = €10/day.	β = −0.597; Exp(β) = 0.55; ***	Each €10 increase in price per day reduces the odds of the choice by 45%. Keep the price within a reasonable range and combine it with unlimited number of trips on public transport and 100% rollover of unused allowance to the next period.
Price piecewise function: (1 unit = €10/day above €40/day).	β = +0.642; Exp(β) = 1.90; ***	Price threshold above approximately €40 per day: further price increases no longer significantly increase the number of people opting out of the choice of a MaaS plan; for offers above €40 per day, the impact of price on choice is smaller.
The plan includes a limited usage amount (specified number of trips, minutes or kilometres)	β = −1.777; Exp(β) = 0.169; ***	Any usage caps (volume limits) substantially reduce the odds of the choice of a MaaS plan by approximately 83%. Offset such limits by offering 100% rollover of the unused allowance to the next period or an unlimited number of trips on public transport.
Rollover of 100% of unused allowance	β = +0.713; Exp(β) = 2.04; ***	Rollover of 100% of unused allowance to the next period significantly increases the choice of the plan (doubles the odds of choosing it). If there are limits on the use of a mode of transport, offer full rollover of unused allowance to the next period as the default option.
Unlimited number of trips on public transport	β = +0.707; Exp(β) = 2.03; ***	An unlimited number of trips on public transport significantly increases the odds of your choice (approximately 2 times). Use this as a key component of your MaaS plan and emphasise unlimited mobility.

Attribute	Coefficients (β, Exp(β), significance)	Interpretation of results and their application
Attitude towards MaaS (standardised factor)	β = +0.385; Exp(β) = 1.47; ***	**A more positive attitude towards MaaS increases the odds of the choice of a MaaS plan by 47%.** Tailor messages to segments already positively inclined; for others, emphasise simplicity, predictability, and the rollover of the unused allowance to the next period.
Interaction between price and attitude towards MaaS	β = −0.009; Exp(β) = 0.99; **	Price becomes more important as respondents' attitudes improve. A positive attitude alone does not increase willingness to pay, so functionality and appropriate pricing are essential.
Awareness of MaaS	β = −0.374; Exp(β) = 0.689; ***	Lower awareness of MaaS is associated with a 31% reduction in the odds of the choice of a MaaS plan. Invest in communication that explains the added value; this will reduce the need to offer discounts.
(E-)bike usage time in minutes per day; 1 unit = 10 min/day.	β = −0.049; Exp(β) = 0.95; ***	Each additional 10 minutes (e-)bike usage per day reduces utility by approximately 5%. Avoid excessive initial (e-)bike minute allowances; offer flexible top-ups of included minutes.
Kilometres travelled by taxi (ride-hailing) per day; 1 unit = 5 km/day.	β = −0.096; Exp(β) = 0.908; *	Every additional 5 km per day by taxi (ride-hailing) reduces efficiency. Include an appropriate number of kilometres; allow for the possibility of adding the necessary number of kilometres to the plan for a fee, rather than including large amounts from the outset.
Three-day plan	β = +0.368; Exp(β) = 1.45; *	The three-day plan is approximately 44.5% more attractive than the one-day plan; a good short-term choice, especially with an unlimited number of trips on public transport.
Weekly plan	β = −0.519; Exp(β) = 0.60; **	The weekly plan is less attractive (−40.5%) than the daily plan; a discount or additional benefits are needed.
Two-week plan	β = −1.123; Exp(β) = 0.33; ***	The two-week plan is significantly less attractive (approximately −67.5%); offer only with significant discounts or additional features.

Attribute	Coefficients (β, Exp(β), significance)	Interpretation of results and their application
Monthly plan	β = −1.678; Exp(β) = 0.19; ***	The monthly plan is the least attractive (−81.3%); position it as a budget option with a large discount or additional benefits.

Key findings

1. **Price is the most important factor.** Each additional €10 per day reduces the odds that respondents will choose a MaaS plan by approximately 45%. However, at higher prices (> €40 per day), the negative impact of price diminishes, creating room for higher-priced offers.
2. **Public transport plays an important role.** An unlimited number of trips on public transport doubles the odds that respondents will choose a MaaS plan. In contrast, a limited number of trips reduces this effect, making such plans less attractive.
3. **Volume restrictions and rollover.** Any limits on the use of a mode of transport significantly reduce the attractiveness of the plan (the odds decrease by approximately 83%). This negative effect is offset by a 100% rollover of unused allowance to the next period, which doubles the choice of a MaaS plan. A 50% rollover of unused allowance is insufficient and has no significant impact on the choice.
4. **Plan duration.** One-day and three-day plans are the most popular (a three-day plan is 45% more attractive than a one-day plan). Longer periods – a week, two weeks, a month – are significantly less attractive and require substantial discounts or additional benefits.
5. **Attitude and awareness.** A positive attitude towards MaaS increases the odds that respondents will choose a plan by 47%, but it does not increase their willingness to pay a higher price, as indicated by the negative interaction between price and attitude. Less informed respondents value an unlimited number of trips on public transport more and may associate MaaS only with public transport.
6. **Other variables.** Additional (e-)bike minutes reduce the usefulness of the plan (by 5% for every 10 minutes), so it is advisable to offer plans with fewer (e-)bike minutes or flexible top-up options. Similarly, the inclusion of taxis in large numbers reduces the attractiveness. (e-)scooter, taxis and car sharing will not significantly change the overall choice of a MaaS plan; they will only be relevant for certain user groups.

4.3 Willingness to Pay for the Mobility as a Service (MaaS)

The calculation of willingness-to-pay indicators is based on model coefficients β. The cost variable is expressed in increments of €10 per day, so the coefficients reflect the impact of price on the probability of choice at this scale. When calculating willingness to pay, the coefficient β for each attribute is divided

by$\beta_{Izmaksas\ dienā}$, the result is multiplied by 10 and calibrated against market prices (actual three-day ticket prices for public transport in Liepāja – €2.00 per day – relative to the WTP coefficient for an unlimited number of trips on public transport of 11.84). This gives a calibration coefficient of 0.169 and a total formula in market prices per day:

$$\text{Calibrated WTP}_{attribute} = -\frac{\beta_{attribute}}{\beta_{Cost\ per\ day}} \times 10 \times 0{,}169$$

This scaling allows WTP to be interpreted as the amount by which respondents are willing to increase or decrease the daily fee if a specific attribute is included in the plan. A positive WTP means that the attribute in question is considered valuable, while a negative WTP indicates that the attribute reduces the attractiveness of the plan and its inclusion requires a discount.

Feature	Calibrated WTP indicator (€/day)	Interpretation
The plan includes limited usage	−5.03	This is the biggest price reducer in the MaaS plan: restrictions on the use of any mode of transport are unattractive – it is advisable to avoid them or offer very small restrictions in combination with a 100% rollover of unused allowance to the next period.
Monthly plan	−4.75	Users expect a discount of approximately €4.75 per day compared to the one-day plan; recommended only in combination with high added value attributes.
Two-week plan	−3.18	A significant discount is required; only to be considered in combination with high-value attributes.
100% of the unused allowance rollover to the next period	+2.02	A high value-added attribute: users are willing to pay approximately €2 more per day for it, and it is recommended to combine this with an unlimited number of trips on public transport throughout the MaaS plan validity period (e.g. one-day, three-day or weekly plan, etc.).
Unlimited travel on public transport	+2.00	Main added value – provides a sense of convenience and security.
Weekly plan	−1.47	If such a plan is offered, a discount compared to the one-day plan is necessary.
Three-day plan	+1.04	A valuable short-term solution; suitable for users who are staying in the city for a short period of time.

Feature	Calibrated WTP indicator (€/day)	Interpretation
Using a taxi (ride-hailing) +5 km/day	−0.27	A slight negative effect: too many included kilometres reduce the value of the MaaS plan. We recommend offering a small starting kilometre allowance, with additional kilometres available for an extra charge at the market price.
(E-)bike use +10 min/day	−0.14	Too many minutes included reduces the value of the MaaS plan as perceived by the user; it is recommended to offer a small starting amount and the option to purchase additional minutes.

Conclusions

- **Highest rated attributes.** Respondents are most willing to pay for an unlimited number of trips on public transport over the validity period of the MaaS plan and for 100% rollover of the unused allowance to the next period – they are willing to pay approximately €2 more per day for each of these. Combining both of these attributes (unlimited number of trips on public transport and 100% rollover of unused allowance) in a three-day plan, the final price would be approximately €7.56 per day on top of the MaaS plan base price of €2.50 per day.
- **The need for discounts on longer-term plans.** Longer subscriptions (weekly, biweekly, monthly plans) reduce respondents' willingness to pay – users expect significant discounts ranging from €1.47 to €4.75 per day compared to the daily plan. For example, for a monthly subscription with an unlimited number of trips on public transport and 100% rollover of unused allowance to the next period, the final price at a base price of €2.50 per day and a monthly plan discount of €4.75 per day would be approximately €1.77 per day.
- **Negative impact of volume restrictions.** Volume restrictions or additional kilometres/minutes included above what is necessary are not attractive – respondents often perceive these attributes as having zero value or even expect a discount. Therefore, they should be avoided or included in the plan only as an additional choice for an extra charge.

MaaS users are willing to pay more for convenience (unlimited number of trips on public transport) and flexibility (100% rollover of unused allowance to the next period), but in longer-term plans and in cases where the plan has usage restrictions, respondents expect substantial discounts (up to €4.75/day).

More detailed information on modelling and model results is available in Section C 6 of the Annex (pp. 167-195).

5 Discussion and Conclusions

Mobility habits and differences between user groups. The sample balance between Liepāja residents (46.2%), tourists (46.5%) and regular travellers (7.3%) allows for a reliable comparison between groups. The purposes of visits indicate different scenarios for the use of MaaS plans: almost half of tourists and regular commuters (49.5%) visit Liepāja for leisure/vacation, while visiting friends/family (17.0%) and business/work (16.1%) account for a smaller proportion. These different motivations influence both the willingness to use MaaS and the willingness to pay for the modes of transport included in the MaaS plan and the extent to which they are used.

Types of transport and differences between groups. Private car use dominates overall, accounting for 44% of all journeys, followed by public transport (24% in total: bus 16.5% and tram 7.6%) and walking (21%). Micromobility (6% in total: (e-)bike 4%, (e)scooter 2%), taxi (ride-hailing) (2%), car sharing (1%) or motorcycle/motor scooter (1%) account for a small proportion. Residents rely more on private cars (55.6%) than tourists (44.4%), while tourists use micromobility and car sharing more often. This picture indicates that residents and tourists need different MaaS plans and also different communication in the context of these plans.

Mobility rhythm and load profile. Residents travel most during weekday peak hours, between 07:00–08:59 and 17:00–17:59, whereas tourists' travel intensity is higher between 10:00–13:59, with greater activity during night-time hours. With weekday and weekend trips combined, car use dominates during the morning and evening rush hours, while tram use increases at lunchtime (12:15–14:15), and walking increases from 15% in the morning to around 31% in the evening. The proportion of taxi (ride-hailing) services used during the day is low, but demand for them increases in the evenings after 18:30. This indicates that there are clearly distinguishable differences in capacity, scheduling and MaaS plan needs throughout the day.

Travel time and fellow travellers. Tourists on weekdays often travel for more than 20 minutes; travel time is longest between 7:00 and 7:59 a.m., 3:00 and 3:59 p.m., and 8:00 and 8:59 p.m. (15–26 minutes). On weekend afternoons, the average travel time is approximately 32 minutes. For residents, travel most often takes 14–20 minutes, but the duration increases for specific purposes (e.g., visits to tourist attractions on weekdays – approximately 22 minutes; family trips on weekends – approximately 23 minutes). Passengers have a significant impact on travel time: residents' travel time increases when travelling with close family members (brother/sister) (24 minutes) or partners (21 minutes on weekdays), but with children on weekends – up to 29 minutes; travel times for tourists are more stable (approximately 20–24 minutes), regardless of travel companions.

Digital behaviour and service availability. Navigation apps are used by approximately 50% of residents and tourists, but residents use public transport information and ticket apps (e.g. the Liepājas pilsēta app) much more frequently (51% vs. 12% of tourists), parking payment (25% vs. 16%) and real-time traffic/planning tools (e.g., "Liepāja city") (19% vs. 6%). Therefore, the MaaS offering for residents should include apps that they already use more frequently (e.g. route planning, parking payment). Tourists, on the other hand, need simple, quick registration in the app and clear daily and three-day plans, including micromobility offers.

Public attitude and perception of mobility as a service (MaaS). 54% of respondents are unfamiliar with the concept of MaaS, 23% know a little about it, 18% know moderately well, and approximately 4% are very well informed. Most respondents agree with the statements that MaaS expands mobility choice (64%) and offers more flexible mobility planning (58%). More than half agree that MaaS could enhance travel happiness (53%) and help them use their time more effectively (53%), while 45-47% of respondents agree with the possibilities of improving accessibility/productivity or reducing travel time of daily trips. 47.1% agree with reducing transportation environmental footprint, while around 39% of respondents have a neutral attitude. The proportion of neutral responses to various statements ranges from 35% to 43%. Low awareness of MaaS and the fact that a positive attitude towards MaaS increases the likelihood of the choice of a MaaS plan indicates that it is necessary to communicate the benefits of MaaS at an individual level – what users will gain by choosing it. This increases the likelihood of the MaaS plan choice to the same extent as offering discounts. On a practical level, this means that communication should specifically highlight the individual benefits that these data indicate are associated with a more positive attitude towards MaaS: lower travel costs (cost savings), time savings and greater flexibility by combining different modes of transport under one subscription, as well as safer and more reliable travel. International examples show that MaaS solutions communicate a very similar set of individual benefits to users. Berlin's Jelbi[4] and Vienna's WienMobil[5] emphasise convenience and time savings: the main message of both platforms is "all modes of transport in one app", where it is possible to plan routes, buy tickets and manage various services in one place. Jelbi complements this message with physical mobility hubs, while WienMobil's communication highlights "the city on your phone screen", emphasising quick access to information and routes.

The impact of price on choice and the role of attributes in choice. Tourists are more likely to choose MaaS plans across the entire price range: at a 60% discount, approximately 48% of tourists choose pre-defined MaaS plans, compared to 26% of residents; at market price – 28% of tourists versus 19% of residents; at a 20% mark-up – 26% of tourists versus 16% of residents; while at a 60% mark-up, interest drops to around 16-17% in both groups. Most often, respondents choose MaaS plans with an unlimited number of trips on public transport and large discounts: at a 60% discount, 46% of respondents choose such plans; at a 20% discount and a 40% mark-up, 32–33% of respondents choose such MaaS plans. If public transport is not included in the MaaS plan, the choice of it is less dependent on price: with a 20% discount, market price and 20% mark-up, the choice is similar (~21–25%). The amount of e-scooter use included in the MaaS plans elicits different reactions to price: at market price, the choice of MaaS plans is similar (approximately 20–24%), but at a 60% discount, MaaS plans with high e-scooter usage are chosen by 50% (compared to 37% if the plan includes low e-scooter usage), so the number of minutes included should be chosen carefully. The extent of taxi (ride-hailing) and car sharing service use significantly influences the final MaaS plan choice: if taxi (ride-hailing) use is initially included at a high/very high level, repeat purchases of the plan are likely to be less frequent than if the plan includes a lower number of minutes. MaaS plans without car sharing or with high usage are chosen more often than those with low

[4] Berliner Verkehrsbetriebe. (n.d.). Berlin's entire public transport and sharing services in just one app [webpage]. Accessed 26.11.2025. Retrieved from https://www.jelbi.de/en/home

[5] Wiener Linien. (n.d.). WienMobil: Enjoy mobile freedom [webpage]. Accessed 26.11.2025. Retrieved from https://www.wienerlinien.at/web/wl-en/wienmobil-enjoy-mobile-freedom

or medium usage. This supports the "all or nothing" strategy. Rollover of unused allowance to the next period significantly increases the attractiveness of the plan: 100% rollover of unused allowance to the next period is chosen in 77% of cases with a 60% discount and in 92% of cases with a 60% mark-up. As the share of unused allowance that can be carried over increases, the impact of price decreases from around a 20% discount on the market price. MaaS plans created by users themselves are also chosen very often, regardless of price (at market price, such plans are chosen by 91% of tourists and 89% of residents; and even at a 60% mark-up – 86% of tourists and 92% of residents, respectively). This confirms that personalisation is very important. MaaS plan sharing is promising: 71% of tourists and 68% of residents are willing to share.

Alignment with the results of the econometric analysis. The logit model confirms the descriptive data analysis: 100% volume transfer ($\beta = +0.713$; $\text{Exp}(\beta) = 2.04$) and unlimited number of trips on public transport ($\beta = +0.707$; $\text{Exp}(\beta) = 2.03$) more than double the odds for public transport, of making a choice while price is the main deterrent ($\beta = -0.597$; $\text{Exp}(\beta) \approx 0.55$). The attitude factor is statistically significant: a more positive attitude increases the choice of by 47% ($\beta = +0.385$; $\text{Exp}(\beta) = 1.47$). At the same time, the interaction Price × Attitude ($\beta \approx -0.009$; $\text{Exp}(\beta) \approx 0.99$) indicates that a favourable attitude alone does not increase willingness to pay if functionality and price are not in balance.

The highest willingness to pay is for 100% rollover of the unused allowance (about €2 per day) and for an unlimited number of trips of public transport (about €2 per day), as well as for a 3-day plan (about €1 per day). Descriptive analysis shows that rollover becomes more important when the MaaS plan carries a 20%, 40% or 60% mark-up, which is why this attribute is significant in the model results. In practice, this means that a 100% rollover should be added when the total plan price is high (i.e., it bundles many services) and includes services that can be obtained more cheaply if purchased separately.

By contrast, the willingness to pay for an unlimited number of trips on public transport should be interpreted in the context of the mark-ups applied in the study: respondents choose MaaS plans with a mark-up more often when unlimited public transport is available, regardless of the other modes included. In effect, respondents partly offset the higher plan price in their perception. As a result, public transport is assigned a higher implicit (subjective) value than the actual price of an unlimited number of trips on public transport.

The results of data modelling reveal that, at certain usage levels, certain modes of transport – such as (e-)bikes (minutes/day) and taxi (ride-hailing) (kilometres/day) – have a negative impact on utility: users are less likely to choose plans that include these modes in small amounts. This result seems counterintuitive, but there is a logical explanation for it in the model.

- Firstly, the amount of service (e.g. 10 minutes by (e-)bike or 5 km by taxi (ride-hailing) per day) is not perceived as sufficient. Users find such an offer too large, creating a feeling of low utility regardless of the price. Therefore, plans with an average volume are rejected, and the attractiveness of the plan may even increase if this service is not included at all – this eliminates the potential effect of an "unnecessary offer".
- Secondly, data analysis shows a pronounced polar choice profile for these services: users either prefer not to include these types at all or choose them with high usage intensity. This is

particularly true for taxi (ride-hailing) – high usage intensity (e.g. above 15 km/day) can provide added value.

- Thirdly, the model shows that the perception of these transport services is more binary than proportional: their choice is based not on a gradual increase in value, but on whether the service provides a full-fledged alternative mobility scenario. Therefore, utility coefficients in these cases are not simply positive at any volume – they change sign depending on the context.

This phenomenon indicates that the usage level should be seen as the minimally required amount, not merely as a logical unit of the offer. MaaS plans that include these modes of transport should ensure lower usage volumes to encourage choice, or these modes should be left as optional components that users can add voluntarily.

The use of e-scooters and car sharing services in the model is not statistically significant. According to the descriptive analysis of the data, a non-linear choice pattern can be observed:

- Firstly, unlike public transport, which is used more widely and frequently, these modes of transport are not used regularly and systematically, and therefore, the assessment within the model is inconsistent. For example, the choice of (e)scooters increases significantly only with very large discounts or very high usage, but under average conditions, interest in them is low.
- Secondly, when creating their MaaS plans, many users either do not include these modes at all or choose them.

This choice logic can be explained by the fact that each of these modes of transport has its own narrow circle of loyal users who use the respective mode of transport consistently and regularly, while other users use it relatively little or not at all.

Practical significance. The results of the discussion point to three priorities:

(i) Public transport as a key component of MaaS plans. Unlimited travel on public transport is the most important element, doubling the chances of choice.

(ii) 100% rollover of unused allowance to the next period as a security and loyalty component. This mechanism reduces the impact of price on respondents' choices, increases the attractiveness of the plan and compensates for restrictions on the use of certain modes of transport. It is worth including this in MaaS plans with higher usage volumes, for which discounts are not appropriate.

(iii) personalisation and sharing options as basic features. These are particularly important for families and small groups – the customised plans are the choice even at higher prices. Offers that include high e-scooter usage level are recommended in combination with discounts. The usage of taxi (ride-hailing) should be included cautiously, avoiding overly generous initial offers. Tourists should be provided with clear short-term plans (one day/three days), while residents should also be provided with monthly offers, where, in addition to the MaaS plan, functionality that most of them already use should also be included: parking payment and real-time traffic/planning options.

5.1 Recommendations

The recommendations provided in this study are based on both international practice regarding general MaaS aspects and the results of the study, which make a specific contribution to the context of implementing specific MaaS plans. The recommendations relate to several important factors that must be taken into account to ensure the successful implementation of mobility as a service.

The recommendations are arranged in order of implementation and include information on the main parties involved in implementing the recommendations.

5.1.1 Improvement of the regulatory framework

Liepāja City Municipal institution "Liepāja Central Administration" (hereinafter – Liepāja CA) in cooperation with the agency "Liepaja Public Transport" (hereinafter referred to as the Agency) needs to carry out a comprehensive assessment of the regulatory framework governing public transport services in the municipality. This analysis includes both national legislation (e.g. the Public Transport Services Act) and binding municipal regulations and regulations issued by the Agency. Particular attention should be paid to identifying potential obstacles that could hinder the implementation of the MaaS platform in the city of Liepāja and the South Kurzeme region.

The implementation of MaaS requires a review of existing regulations that go beyond the administration of the traditional transport sector with regard to:

- **data sharing standards between different transport operators.** Studies show that data availability and interoperability are the main barriers to the development of MaaS in Europe.[6] The physical availability of vehicles and the harmonisation of digital information are critical to the successful operation of MaaS. Technical solutions include real-time data integration from physical infrastructure using sensors to monitor the availability of (e-)bikes and e-scooters. GPS systems for shared transport, parking sensors at mobility points, and API interfaces for data exchange between physical infrastructure and the MaaS platform.[7] A unified identification system is also needed, including RFID or NFC cards and applications for access to all modes of mobility, QR code systems for unlocking (e-)bikes and e-scooters, and an integrated payment system for all services. The lack of a unified identification system, for example, was one of the main obstacles to the development of MaaS in Amsterdam and Birmingham.[8]

[6] Eckhardt, J., Nykänen, L., Aapaoja, A., & Niemi, P. (2018). MaaS in rural areas - case Finland. *Research in Transportation Business & Management, 27,* 75-83.

[7] Kamargianni, M., & Matyas, M. (2017). The business ecosystem of mobility-as-a-service. *Proceedings of the 96th Transportation Research Board (TRB) Annual Meeting,* Washington DC

[8] Hirschhorn, F., Paulsson, A., Sørensen, C. H., & Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. *Transportation Research Part A: Policy and Practice, 130,* 178-191.

- **an integrated ticketing system** that allows users to pay for all modes of transport through a single platform. This is a technical and legal challenge that requires political will and investment of resources;[9]
- **not increasing the administrative burden on users and transport operators** between promoting innovation and ensuring public benefit. Finding a regulatory balance that promotes innovation while guaranteeing public benefits will be critical for the future development of MaaS.[10]

5.1.2 Decision on appointing the MaaS platform operator and identification of other involved parties

The Liepāja City Council must make strategic decisions on the implementation and development of the MaaS platform in the city, and the South Kurzeme Region Municipal Council must also be informed about the potential use of the MaaS platform outside the city of Liepāja.

- Liepāja CA and the Agency need to define their role in the MaaS ecosystem, where there are various alternatives: **the role of a service provider** with a focus on providing core transport services, allowing the MaaS operator to manage the customer interface and service delivery (registration, bookings, payments and day-to-day communication with passengers). This approach could minimise investment but also limit the impact on the overall value chain; **the role of a strategic partner**, which involves active participation in the development and operation of the MaaS platform, while retaining partial control over customer relations. The study indicates that this approach could be optimal for local operators, given the size of the market and resource constraints;
- **The role of a MaaS operator** with full control over the MaaS platform, integrating other service providers. This approach is most successful for public transport operators with a strong market position, as is the case in Helsinki with the public transport operator HSL.[11]

In the context of this study, considering that 33% of respondents use public transport at least once a week, the Agency should consider the role of a MaaS operator to maximise the existing customer base, while Liepaja CA could take on the role of a strategic partner, which is important for the city's long-term development planning. In a sense, the Agency would also retain its role as a service provider, as it would ensure the availability of public services, but other market participants would be given the opportunity to provide other transport services.

The MaaS operator must provide the resources necessary for the creation and maintenance of the digital infrastructure required for the operation of the MaaS platform – IT, customer support, data analytics, and

[9] Hirschhorn, F., Paulsson, A., Sørensen, C. H., & Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. *Transportation Research Part A: Policy and Practice, 130,* 178-191.

[10] Smith, G., Sochor, J., & Karlsson, I. C. M. (2018). Mobility as a Service: Development scenarios and implications for public transport. *Research in Transportation Economics, 69,* 592-599.

[11] Hirschhorn, F., Paulsson, A., Sørensen, C. H., Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. *Transportation Research Part A: Policy and Practice,* 130, 178-191.

cooperation with operators. At the same time, however, it is important to involve strategic partners such as Liepāja CA and Liepāja City Council.

However, considering the long-term perspective and the development potential of the MaaS platform, as well as the achievement of financial and environmental KPIs (key performance indicators), it may be useful to consider establishing a separate institution in the future. Such an institution would specialise specifically in performing the functions of a MaaS operator, thus separating them from the tasks of a traditional public transport operator.

Successful implementation of MaaS projects requires clear management structures, as the choice of management model has a significant impact on the results of MaaS projects.[12] Therefore, it is necessary to establish a MaaS operator with a clear mandate, define decision-making levels and responsibilities, introduce rapid decision-making processes to support innovation, and ensure regular reporting to senior management.

With regard to project management, a hybrid project management approach can be used, combining the traditional *waterfall* approach for infrastructure projects, *Agile* methodology for digital solution development, *Lean principles* for process optimisation, and design thinking for improving user experience.[13]

It is also advisable to develop a comprehensive KPI system that includes technical indicators (API availability, data quality), business indicators (revenue, costs), customer indicators (satisfaction, number of users), and innovation indicators (introduction of new features, experiments).

Data analytics is becoming an integral part of quality management in the MaaS ecosystem. A data-driven approach is one of the key success factors for MaaS.[14] The use of data for strategic planning and decision-making, especially for route optimisation based on demand data, resource planning using forecasting models, price strategy adjustment based on elasticity analysis, and investment prioritisation using return on investment (ROI) analysis.[15] Therefore, the MaaS operator must maintain and develop a data analytics department.

5.1.3 Decision on the development of the MaaS platform IT system

Technically, there are three main solutions available for implementing a MaaS platform.

Firstly, it is possible to create a proprietary MaaS platform, which Liepāja CA or the Agency would develop entirely independently from scratch. This solution provides complete control over the platform's

[12] Smith, G., Sochor, J., Karlsson, I. C. M. (2018). Mobility as a Service: Development scenarios and implications for public transport. *Research in Transportation Economics,* 69, 592-599.

[13] Hirschhorn, F., Paulsson, A., Sørensen, C. H., Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. *Transportation Research Part A: Policy and Practice,* 130, 178-191.

[14] Arias-Molinares, D., García-Palomares, J. C. (2020). The Ws of MaaS: Understanding mobility as a service from a literature review. *IATSS Research,* 44(3), 253-263.

[15] TNO. (2020). *Policy options to steer Mobility as a Service: International case studies.* The Hague: TNO.

functionality and the ability to adapt it to specific local needs, but requires significant resources, time and qualified IT specialists.

Secondly, a subscription-based MaaS platform (e.g. *Whim, Mobility Mixx*, etc.) is available, which means using a ready-made solution from an external service provider for a regular subscription fee. This option allows you to quickly launch the platform with relatively low initial costs and provides regular updates, but offers more limited customisation options and creates dependence on a specific service provider.

Thirdly, it is possible to commission the development of the platform from external professional service providers who will develop an individual solution in accordance with the specifications of the Liepāja municipality. This approach combines professional development quality with adaptability, although it also creates a certain dependence on the chosen developer and requires medium to high investment.

Infrastructure digitisation includes an automated warning system for technical problems, real-time information on the status and charge of (e-)bikes and e-scooters, as well as data collection and analysis for optimal resource allocation. Organisational coordination between the transport department, IT department, urban planning department, private mobility service providers and the MaaS platform operator must be ensured.[16]

The experience of Amsterdam shows that the creation of a special coordination platform (a framework for cooperation between all parties involved), which brings together local authorities, public transport operators and private shared mobility service providers, ensures effective cooperation. [17]

In addition to the creation and development of the platform, Liepāja CA and the Agency must take into account the need to allocate a budget for the development of physical mobility infrastructure, such as (e-)bike parking facilities, electric car charging stations and other solutions that would promote a diverse and integrated mobility ecosystem.

5.1.4 Determining the MaaS plan offering

International experience shows that the integration of public transport with other modes of transport is critical to the successful operation of MaaS platforms. The UbiGo pilot project in Gothenburg, Sweden, between 2013 and 2014 showed that public transport is the most important mode of transport for users, regardless of their socio-demographic characteristics.[18] The project achieved positive modal shift results, with 36% of users who did not own a car stating that they would postpone purchasing one, while 35% of regular car users indicated that they would switch to public transport and micromobility.[19][20] These data

[16] Smith, G., Sochor, J., Karlsson, I. C. M. (2018). Mobility as a Service: Development scenarios and implications for public transport. *Research in Transportation Economics, 69,* 592-599.

[17] Hirschhorn, F., Paulsson, A., Sørensen, C. H., Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. *Transportation Research Part A: Policy and Practice, 130,* 178-191.

[18] Strömberg, H., Karlsson, I. C. M., Sochor, J. (2018). Inviting travellers to the smorgasbord of sustainable urban transport: Evidence from a MaaS field trial. *Transportation, 45(*6), 1655-1670.

[19] Karlsson, M., Sochor, J., Strömberg, H. (2017). Developing the 'Service' in Mobility as a Service: Experiences from a field trial of an innovative travel brokerage. *Transportation Research Procedia, 14,* 3265-3273.

[20] Strömberg, H., Karlsson, I. C. M., Sochor, J. (2018). Inviting travellers to the smorgasbord of sustainable urban transport: Evidence from a MaaS field trial. *Transportation, 45(*6), 1655-1670.

confirm that an integrated MaaS platform can significantly change users' mobility habits and promote a more sustainable transport system if public transport is included as a basic service, while providing flexible and accessible alternative solutions for different travel needs.

Similarly, data from the *Whim* MaaS app in Helsinki (Finland, 2016-2018) confirms the central role of public transport: Of all trips recorded using the MaaS app, 73% were made by public transport, while 48% of the city's residents used public transport during the same period.[21]

However, the experience of both pilot projects also revealed a financial challenge: as public transport is a subsidised service, MaaS operators cannot set higher prices for public transport tickets than the market price, which limits their revenue and requires support for the development of sustainable business models.[22(,)23]Recent studies on Jelbi in Berlin and the WienMobil mobility stations in Vienna complement the above-mentioned insights on the central role of public transport in the MaaS ecosystem. The qualitative analysis of Jelbi shows that MaaS is still a niche product and that some users do not perceive sufficient added value compared with ordinary journey-planning apps. The symbolic and emotional attachment to the private car, as well as whether MaaS can offer a positive identity based on access to mobility services rather than vehicle ownership, are more important factors than socio-demographic characteristics.[24] The WienMobil case study, in turn, shows that infrastructure provision alone is not sufficient: the three public mobility stations are underused, which is explained by their peripheral location, the absence of a unified fares and ticketing system, relatively high costs, reliability issues and, in particular, low publicity and a lack of awareness-raising and educational campaigns.[25]

Key recommendations for Liepāja CA and Liepāja City Council:

- **continue to recognise public transport as the backbone of MaaS** – data from this study (94% of users consider public transport to be part of their MaaS plan) and several international studies show that public transport is a basic service that users look for when joining the MaaS platform, and that without it, other mobility services cannot function effectively together.[26,27,28] Policy

[21] Arias-Molinares, D., & García-Palomares, J. C. (2020). The Ws of MaaS: Understanding mobility as a service from a literature review. *IATSS Research, 44(*3), 253-263.

[22] Arias-Molinares, D., & García-Palomares, J. C. (2020). The Ws of MaaS: Understanding mobility as a service from a literature review. IATSS Research, 44(3), 253-263.

[23] Sochor, J., Strömberg, H., & Karlsson, I. C. M. (2015). Implementing Mobility as a Service: Challenges in integrating user, commercial, and societal perspectives. Transportation Research Record, 2536(1), 1-9.

[24] Hauslbauer, A. L., Verse, B., Guenther, E., & Petzoldt, T. (2024). Access over ownership: Barriers and psychological motives for adopting mobility as a service (MaaS) from the perspective of users and non-users. Transportation Research Interdisciplinary Perspectives, 23, 101005.

[25] Costa da Silva, L. M., & Uhlmann, J. (2021). Contributing factors for the underutilization of mobility stations: The case of the "Wien Mobil Station" in Vienna. Revista Produção e Desenvolvimento, 7, e508.

[26] Durand, A., Harms, L., Hoogendoorn-Lanser, S., Zijlstra, T. (2018). *Mobility-as-a-Service and changes in travel preferences and travel behaviour: A literature review.* Netherlands Institute for Transport Policy Analysis (KiM).

[27] Haahtela, T., & Viitamo, E. (2017). Searching for the potential of MaaS in commuting - Comparison of survey and focus group methods and results. Proceedings of the 1st International Conference on Mobility as a Service, Tampere, Finland.

[28] Mulley, C., Nelson, J. D., Teal, R., Wright, S., & Daniels, R. (2018). Barriers to implementing flexible transport services: An international comparison of the experiences in Australia, Europe and the USA. Research in Transportation Business & Management, 27, 3-11.

makers must ensure that public transport retains its priority role in the MaaS ecosystem and does not become just one of many equal transport services.

- **It is necessary to maintain user fees** – as demonstrated by the IMAP public consultation and confirmed by international practice, completely free public transport: (a) mainly attracts existing users rather than car owners; (b) does not promote responsible use of services; (c) makes it difficult to understand real demand. Therefore, a fully subsidised by the municipality but not a free MaaS plan is the most optimal solution, ensuring the long-term availability of public transport and balancing it with a responsible use.

This means that Liepāja CA and Liepāja City Council must ensure stable funding for public transport in order to guarantee the services offered in MaaS plans. This funding must not be reduced due to the introduction of MaaS, as this could jeopardise the quality of service and public transport as a backbone function. It must be ensured that public transport prices in MaaS plans do not increase separately so that users can see a clear benefit.

Research data clearly shows that only 6% of cases create their MaaS plans without including public transport tickets. Therefore, the presence of public transport is the main factor determining users' choice in favour of MaaS solutions. By including an unlimited number of trips on public transport in all MaaS plans, the willingness to pay for such a plan increases by *€2* per day. In practice, this would mean that the user's MaaS plan includes a public transport pass – they can use public transport during the chosen period without having to buy additional tickets for each trip. An unlimited number of trips on public transport outweighs the additional cost, as well as the accessibility and safety risks that users take on when adding other modes to the MaaS plan – e-scooters, (e-)bikes, taxi (ride-hailing) and car sharing. For each of these modes of transport, the user initially indicates the desired amount of use. The results of data modelling show that users are interested in using this additional service package, even if its prices correspond to market prices, because the decisive factor in users' choice is precisely the availability of public transport in the Maas plan.

Based on the research data, Table 1 summarises the usage volumes offered in the initial phase of MaaS plan implementation, their prices and additional volume increments for each mode of transport. These volumes are adapted to the actual choices of users and vary for different modes of transport. If unlimited use is available for any of these modes of transport (e.g. a day pass for an (e-)bike), this option should also be included among the choices available to the user.

The price is indicated for each volume choice: the "market price" is the amount that the user would pay when purchasing an identical volume from the respective service provider without using the MaaS platform; the "discount" is a percentage reduction from this market price.

Table 1. Volumes and prices offered for each mode of transport depending on the MaaS plan term

Type	Amounts	Daily plans	Three-day plans	Weekly plans	Two-week plans	Monthly plans
E-scooters	Starting volume	15 minutes / market price	30 minutes / market price	45 minutes / market price	60 minutes / market price	90 minutes / market price
	Additional steps	10 minutes / market price	10 minutes / market price	10 minutes / market price	10 minutes / market price	10 minutes / market price
	High usage	60 minutes / 40% discount	90 minutes / 40% discount	120 minutes / 40% discount	180 minutes / 40% discount	240 minutes / 40% discount
(E-)bikes	Initial amount	15 minutes / market price	30 minutes / market price	60 minutes / market price	90 minutes / market price	180 minutes / market price
	Average volume	30 minutes / market price	60 minutes / market price	90 minutes / market price	120 minutes / market price	300 minutes / market price
	Additional steps	10 minutes / market price	10 minutes / market price	10 minutes / market price	10 minutes / market price	10 minutes / market price
Taxis	Starting volume	5 km / 20% discount	10 km / 20% discount	20 km / 20% discount	30 km / 20% discount	50 km / 20% discount
	Additional steps	5 km / market price	5 km / market price	5 km / market price	5 km / market price	5 km / market price
Car sharing	Initial amount	15 km/market price	40 km / market price	60 km / market price	100 km / market price	150 km / market price
	Additional steps	10 km / market price	10 km / market price	10 km / market price	10 km / market price	10 km / market price
Public transport	For all MaaS plans	Unlimited number of trips during the MaaS plan period	Unlimited number of trips during the MaaS plan period	Unlimited number of trips during the MaaS plan period	Unlimited number of trips during the MaaS plan period	Unlimited number of trips during the MaaS plan period

For users who choose MaaS plans with average (e-)bike usage, as well as all users who purchase MaaS plans with a term exceeding one week, it would be desirable to ensure 100% rollover of unused allowance to the next period, which would be valid for two consecutive periods. For example, if a user purchases a weekly MaaS plan with 100% rollover, they can use their unused volume within a total of three weeks from the date of purchase (the week of purchase and the two following periods), regardless of the term of the choice of MaaS plan they choose in the future.

The usage volumes, prices and additional volume increments summarised in Table 1 are based solely on survey data characterising user choice. This does not mean that such a price offer is financially feasible. Therefore, the Agency, in cooperation with Liepāja CA, would need to carry out a cost-benefit analysis, balancing the possible increase in expenditure for certain modes of transport with the benefits of more intensive use of public transport. Given that fixed costs dominate in public transport, an increase in

passenger numbers with an unchanged budget can improve the cost ratio and increase revenues in the system. When performing a cost-benefit analysis, the percentage indicators shown in Table 2, which characterise the maximum possible share of users in the initial phase of service implementation, can be used as a guide. These indicators reflect the proportion of choices made during the summer months when data was collected for this study and refer to the choice of a specific mode of transport for a given volume of use. In actual implementation, they should be adjusted for seasonal fluctuations, supply capacity and actual pricing policy.

Table 2. Share of choice of a MaaS plan during the summer months, depending on the usage volume of a specific mode of transport.

Mode of transport	Usage	Expected choice share among all MaaS users
E-scooters	Initial volume	20%
	High usage volume	17%
(E-)bikes	Initial volume	15%
	Average volume	12%
Taxis	Initial volume	21%
Car sharing	Initial amount	14%
Public transport	Unlimited number of trips	36%
	At least one journey	94%

The Agency must also provide for the possibility of sharing the MaaS plan with another user, such as a family member. The study tested a scenario in which sharing with one additional person resulted in a 10% increase in costs. Under these circumstances, 92% of users who were willing to share their MaaS plan confirmed their willingness to do so. This means that a small increase in costs is not a significant obstacle to sharing these plans.

5.1.5 Discussions with potential transport and micromobility service operators

As the MaaS platform operator and service provider, the Agency, with the involvement of Liepāja CA as a strategic partner, can, after developing the Maas plan, hold discussions with other transport operators offering vehicle sharing services and micromobility service providers. International experience shows that transport operators are considered the most important participants in the implementation of MaaS. The successful implementation of MaaS depends on the platform provider's ability to attract as many operators as possible to its platform.[29]

The aim of the negotiations is to agree on revenue sharing and data standardisation. A successful MaaS platform is based on uniform data standards that ensure the smooth exchange of information between

[29] Vij, A., Dühr, S. (2022). The commercial viability of Mobility-as-a-Service (MaaS): What's in it for existing transport operators, and why should governments intervene? Transport Reviews, 42(5), 695-716.

different service providers. The harmonisation of data standards is one of the main prerequisites for the implementation of MaaS. [30]

For example:

- GTFS (*General Transit Feed Specification*) for public transport – ensures the standardisation of route, stop and timetable data, which is already used by the Agency;
- GBFS (*General Bikeshare Feed Specification*) for (e-)bike sharing – standardises information on (e-)bike availability and station locations;
- MDS (*Mobility Data Specification*) for micromobility solutions – defines how local authorities and operators exchange data on micromobility vehicles, such as their locations, movements and availability.

The implementation of standards requires a systematic approach, and the most successful MaaS projects are those where operators have proactively participated in the development and implementation of standards.[31] Operators need to set up specialised teams or appoint responsible employees to ensure the implementation, updating, quality control and other aspects of the standards.

In general, transport operators must provide real-time information on the location, availability and timetable of vehicles. The data from this study shows that users highly value real-time information, and its absence can significantly reduce the attractiveness of a MaaS platform. The experience of the *Whim* platform in Helsinki demonstrates that accurate real-time information is essential for user satisfaction.[32] Although most direct interaction with users will take place through the MaaS platform, transport operators still have an important role to play in shaping the overall user experience. The user perspective is central to the development of MaaS.[33] Operators need to identify and optimise all touchpoints with users: physical infrastructure (stops, stations, vehicles), digital touchpoints (APIs, data streams), human touchpoints (customer service), informational touchpoints (signs, announcements).

One of the biggest challenges in implementing MaaS is the fair distribution of revenue among operators. Operators must participate in the development of a transparent revenue-sharing model based on actual service usage. Without the active role of the Agency as a MaaS operator, integration between operators will be fragmented, which may strengthen the monopolistic influence of individual operators on the platform.[34]

One revenue sharing model could be a hybrid model that combines fixed payments (for infrastructure maintenance) with variable payments (for actual usage). This approach provides both stable base revenue

[30] Arias-Molinares, D., García-Palomares, J. C. (2020). The Ws of MaaS: Understanding mobility as a service from a literature review. *IATSS Research,* 44(3), 253-263.
[31] TNO. (2020). *Policy options to steer Mobility as a Service: International case studies.* The Hague: TNO.
[32] Sochor, J., Arby, H., Karlsson, I. C. M., Sarasini, S. (2018). A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals. Research in Transportation Business & Management, 27, 3-14.
[33] Lyons, G., Hammond, P., Mackay, K. (2019). The importance of user perspective in the evolution of MaaS. *Transportation Research Part A: Policy and Practice,* 121, 22-36.
[34] Vij, A., Dühr, S. (2022). The commercial viability of Mobility-as-a-Service (MaaS): What's in it for existing transport operators, and why should governments intervene? Transport Reviews, 42(5), 695-716.

and an incentive to improve service quality.[35] The revenue sharing model should also include risk sharing mechanisms, such as minimum revenue guarantees for new operators, compensation mechanisms in cases of *force majeure*, flexible adjustment options in response to changing market conditions, and joint investment funds for infrastructure development.

Transparency is essential for building trust among MaaS ecosystem participants,[36] and tools for building it can include real-time transaction traceability, regular financial reports, independent audits, and clear dispute resolution mechanisms.

A bad experience with one operator can affect the reputation of the entire platform, and trust is a key factor in building user loyalty.[37] Therefore, strict quality standards relating to the technical readiness of vehicles, cleanliness and comfort standards, as well as customer service standards, must be developed and implemented in negotiations with operators.

In addition, the introduction of proactive problem solving promotes the timely receipt of information, such as automatic alerts to users about possible disruptions, real-time alternative route suggestions, and compensation mechanisms in the event of service disruptions.[38]

It is also desirable to introduce a systematic approach to service improvement, such as regular user surveys, comparison and evaluation with the best MaaS operators on the market. The study data show that 68% of respondents consider convenience to be a very important factor when choosing a mode of transport, which also emphasises and justifies the need for high standards of comfort and convenience.

5.1.6 Pricing policy

The transition to the MaaS model requires a well-thought-out strategy for pricing principles. A survey of London residents revealed that clarity and flexibility of pricing structures are among the key factors influencing users' willingness to use MaaS services.[39] Similarly, each additional *€10* per day reduced the probability of making the plan choice by 45%. However, at higher prices (>*€40* per day), the impact of price diminishes.

The Agency, in collaboration with Liepāja CA, can implement strategic pricing in Maas plans to achieve public objectives.[40] This includes: (a) assessing price elasticity for different modes of mobility; (b) creating

[35] Ambrosino, G., Nelson, J. D., Boero, M., Pettinelli, I. (2016). Enabling intermodal urban transport through complementary services: From flexible mobility services to the shared use mobility agency. Research in Transportation Economics, 59, 179-184.
[36] Lyons, G., Hammond, P., & Mackay, K. (2019). The importance of user perspective in the evolution of MaaS. *Transportation Research Part A: Policy and Practice,* 121, 22-36.
[37] Sochor, J., Arby, H., Karlsson, I. C. M., Sarasini, S. (2018). A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals. *Research in Transportation Business & Management,* 27, 3-14.
[38] Hensher, D. A., Mulley, C., Ho, C., Wong, Y., Smith, G., Nelson, J. D. (2021). Understanding Mobility as a Service (MaaS): Past, present and future. *Transportation Research Part C: Emerging Technologies,* 131, 103328.
[39] Kamargianni, M., Matyas, M., Li, W., Muscat, K. (2018). Londoners' attitudes towards car-ownership and Mobility-as-a-Service: Impact assessment and opportunities that lie ahead. London: MaaSLab, UCL Energy Institute.
[40] Smith, G., Sochor, J., & Karlsson, I. C. M. (2018). Mobility as a Service: Development scenarios and implications for public transport. *Research in Transportation Economics, 69,* 592-599.

subsidised service packages for specific target groups; (c) introducing incentive systems for the choice of more sustainable modes of transport.

For example, based on price elasticity and as shown in Table 1, offering a 20% discount on the first kilometres of a taxi (ride-hailing) ride increases the odds of making a choice for this service by approximately 27%. This can promote the accessibility of the service and economies of scale; depending on market conditions, it can reduce average costs and further stimulate demand.

The Liepāja City Municipality and the South Kurzeme Region Municipality (if MaaS plans are also provided in the South Kurzeme region) should subsidise MaaS plans for certain social groups (students, pensioners, low-income families) to ensure equal access to mobility.[41] Furthermore, it should be noted that MaaS can deepen inequalities between urban centres and suburbs[42] , so demand-based solutions should be promoted in less populated areas, with subsidies for service provision in unprofitable areas. In turn, the incentive to reduce the CO_2 footprint can be implemented, for example, by granting an additional 10% discount to MaaS users who make the choice of a shared electric car or an electric taxi (ride-hailing).

At the same time, however, the pricing policy must also take into account the ability of the Liepāja City Municipality and the South Kurzeme Region Municipality to subsidise public transport. Therefore, as indicated in section 5.4 of this study, a cost-benefit analysis should be carried out in order to develop a sustainable and binding pricing policy for all MaaS service providers, both public transport operators and micro-mobility service providers.

5.1.7 API development

API development and maintenance is a critical component of successful MaaS integration. An analysis of the MaaS implementation experience in Amsterdam, Birmingham and Helsinki shows that API quality and availability directly affect the functionality of MaaS platforms and the user experience.[43]

As a MaaS operator, the Agency must develop an API as a clear management mechanism between the platform and service providers (transport operators and micromobility), enabling simple and reliable exchange of essential data and activities. The API must be aligned with the business model and public objectives, ensuring:

- information on service availability, location and status;
- descriptions of tariffs and conditions;
- offer and reservation confirmations;
- recording of trip events;
- payments;
- as well as customer support and query reports.

[41] Durand, A., Harms, L., Hoogendoorn-Lanser, S., & Zijlstra, T. (2018). *Mobility-as-a-Service and changes in travel preferences and travel behaviour: A literature review.* Netherlands Institute for Transport Policy Analysis (KiM).

[42] Smith, G., Sochor, J., & Karlsson, I. C. M. (2018). Mobility as a Service: Development scenarios and implications for public transport. *Research in Transportation Economics,* 69, 592-599.

[43] Hirschhorn, F., Paulsson, A., Sørensen, C. H., Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. Transportation Research Part A: Policy and Practice, 130, 178-191.

The Agency must consider security and privacy at the design stage – with data minimisation, clear purposes of use, user consent and transparent rights over their data.

This approach ensures that the API is not just a technical interface, but a tool for achieving public goals.

5.1.8 Design and user experience

The user perspective and easy access to information are essential in the evolution of MaaS.[44] When developing the user experience and design of the MaaS plan, the Agency is advised to base it on the currently widely used and user-friendly operating logic of applications, such as navigation, public transport ticket purchasing, parking payment, taxi booking and car sharing apps. To promote sustainable mobility, we suggest displaying a real-time comparison of routes (fastest, cheapest, most environmentally friendly).[45]

In order to include different social groups in the design, greater digital accessibility (different font sizes, voice control), information availability in multiple languages and alternative communication channels (telephone, physical locations) must be provided.

Compliance with the General Data Protection Regulation and other data protection regulations is critical in the MaaS ecosystem, and data management issues are often a significant barrier to the implementation of MaaS.[46] Therefore, along with the development of a user card, processes for ensuring data protection must also be established, and a balance between data collection and privacy protection must be ensured.

The design should also provide for the introduction of loyalty and support systems (e.g. bonuses for using public transport and micromobility), discounts and personalised plans for specific groups (e.g. families with children, seniors, people with special needs), and promoting a culture of sharing by offering bonuses for sharing MaaS plans with other users (as indicated in the Study: 68-71% of users are willing to do so).

The Agency is advised to introduce a feature in the MaaS app that informs users about their usage habits – number of steps taken, time spent on the road and most frequently used plans. Such feedback encourages behavioural change and more frequent use of MaaS, reducing the need to maintain a private car.

5.1.9 Implementation and promotion, taking into account the pilot project approach

The introduction of MaaS services can significantly change users' travel habits, exceeding the capacity of the currently available infrastructure. Therefore, it is advisable to introduce the choice of additional transport options in MaaS plans gradually, avoiding mass communication campaigns that could overload the system or create excessively high expectations.

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[44] Lyons, G., Hammond, P., Mackay, K. (2019). The importance of user perspective in the evolution of MaaS. *Transportation Research Part A: Policy and Practice, 121,* 22-36.

[45] Some examples of solutions: TripGo, BookSmart24, Google Maps

[46] Hirschhorn, F., Paulsson, A., Sørensen, C. H., Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. *Transportation Research Part A: Policy and Practice,* 130, 178-191.

5.1.9.1 Promoting modal shift [47]

Studies show that MaaS can promote modal shift – users switch from one mode of transport to another, increasing the use of different modes. However, the following factors should be taken into account:

- **the risk of consumer leakage from public transport** – in some cases, regular public transport users switch to car sharing or to a taxi (ride-hailing) if MaaS makes these options more accessible;[48,49]
- **positive impact** – car sharing users increase their use of public transport and active modes of mobility after joining MaaS platforms;[50]
- **need for regular monitoring** – the Agency should monitor user travel patterns to ensure that MaaS is actually promoting a shift to more sustainable modes of transport, rather than the opposite (e.g. quarterly analysis of usage data showing trends in the use of each mode of transport and allowing timely adjustments to pricing policies or service availability).

One solution is therefore to set up a MaaS innovation fund to support pilot projects and research into changing residents' habits.

5.1.9.2 Expanding the MaaS user base

Based on the information obtained during the study, the involvement of existing users can be encouraged by offering targeted discounts for the use of additional modes of transport. Users who only use one or two modes of transport from the MaaS offering could be offered a new mode with an initial discount of 20%. If the user's behaviour does not change, a 40% discount can be offered. Larger discounts are not necessary, as their effectiveness does not increase significantly.

As a MaaS operator, the Agency could start attracting new users with a digital communication campaign targeting audiences that already have a positive attitude towards MaaS plans. These include: users of navigation apps (e.g. *Google Maps, Waze)*; users of apps that allow on-demand travel bookings (e.g. minibuses, intercity buses and trains); users of micromobility sharing services.

The Agency, in cooperation with major employers, could introduce corporate “workday” passes, valid only on working days (Monday to Friday), excluding weekends, which would include guarantees of timely connections and on-time arrival at the destination, for example compensation in the event of delays, extension of the pass, or provision of alternative transport at the service provider’s expense.

This mechanism is particularly effective in addressing users who mainly use private cars for their daily commute. It is an opportunity to encourage them to switch to public transport and more sustainable modes of mobility. There are also various ways in which employers could provide such a bonus to their employees, for example by offering it as part of a social benefits package or by co-financing part of the cost of a MaaS plan.

[47] Modal shift or modal transfer, which means switching from one mode of transport to another.

[48] Kamargianni, M., Matyas, M., Li, W., Muscat, K. (2018). Londoners' attitudes towards car ownership and Mobility-as-a-Service: Impact assessment and opportunities that lie ahead. London: MaaSLab, UCL Energy Institute.

[49] Kamargianni, M., Matyas, M., Li, W., Muscat, K., Yfantis, L. (2018). The MaaS dictionary. London: MaaSLab, UCL Energy Institute.

[50] Martin, E., Shaheen, S. (2011). The impact of carsharing on public transit and non-motorised travel: An exploration of North American carsharing survey data. *Energies,* 4*(*11), 2094-2114.

The final stage would be a public campaign aimed at changing the neutral attitude of residents and tourists by emphasising that MaaS offers flexibility and the ability to adapt to different situations, thus saving time and ensuring predictable and reliable travel.

The emphasis in this communication varies depending on the target audience:

- **For residents**, the emphasis is on personal benefits: time savings, convenience, safety and overall satisfaction with travel. Research data shows that messages formulated in this way encourage 54-57% of residents to choose MaaS plans, while without them, the choice drops to 30-43%.
- **For tourists**, the emphasis is on cost-effectiveness, diversity of travel options and short-term flexibility (e.g. the ability to use a single plan for different routes and modes of transport during a short stay).

5.1.9.3 Participation in the development of MaaS

As a MaaS operator, the Agency should create a digital engagement platform (similar to participatory budgeting) where users can vote on the introduction of new services or features. Advisory councils and working groups are described as a "multifaceted participation tool" that ensures the inclusion of the views of the public, social partners, local authorities and other stakeholders in decision-making.[51] This means that such formats help to avoid situations where decisions are made only by civil servants or politicians, while the public feels excluded.

In the context of the city of Liepāja and the South Kurzeme region, such advisory councils and neighbourhood associations can be particularly important. These regions include both urban and rural areas with different mobility habits and needs. Therefore, in order for MaaS solutions to be sustainable and tailored to local users, broad involvement of residents is needed at various levels – from the city centre to smaller neighbourhoods and rural areas.

For example, in Liepāja, residents' councils could act as a permanent consultative platform, providing proposals on public transport accessibility, micromobility infrastructure or the introduction of integrated tickets. In the South Kurzeme region, where residents' mobility is closely linked to the city centre of Liepāja, councils could help coordinate inter-regional mobility solutions, such as *park-and-ride* systems and shared transport.

Research shows that such structures also help to activate residents who have not previously been involved in participatory processes.[52] Residents' advisory councils also operate in territorial units (e.g. parishes, neighbourhoods), ensuring that a specific territory is taken into account – which is essential when it comes to mobility or transport solutions in a specific city or neighbourhood.

Although advisory councils are often perceived as a formal mechanism, their potential is considerable – they can be a tool that allows the public to have a real impact on decisions about mobility, transport

[51] Advisory councils and working groups – a multifaceted participation tool. (2021, 19 March). *LV portal.* Retrieved from: https://lvportals.lv/skaidrojumi/326092-konsultativas-padomes-un-darba-grupas-daudzpusigs-lidzdalibas-instruments-2021

[52] Iedzīvotāju padomes: pieredze, idejas, problēmas. (29 June 2025). *Kurzemnieks.* Retrieved from: https://kurzemnieks.lv/projekti/izpeti-izgaismo-risini/iedzivotaju-padomes-pieredze-idejas-problemas

infrastructure and the development of digital services. Thus, the development of such an engagement format in Liepāja and the South Kurzeme region would be an important step towards an integrated MaaS system tailored to the needs of the public.

In turn, guest/tourist feedback and recommendations could be collected digitally for further analysis.

The Agency regularly organises user surveys and tests to improve the functionality of MaaS. An accessible "user recommendation database" is provided, showing the most popular areas for improvement and the status of their implementation. Cooperation with *start-up* companies offering innovative mobility solutions is encouraged.

5.1.10 Time frame

Gradual and thoughtful implementation of MaaS throughout the city and region, starting with pilot projects in a limited area, learning from mistakes and adapting plans and models, gradually expanding to other areas of the city and region, as well as ensuring regular feedback and relying on data. Finland's experience also shows that the development of MaaS in Helsinki took place gradually over a period of five years, which allowed technical, legal and organisational challenges to be resolved. [53]

5.1.10.1 Short-term priorities (0-12 months)

For the Agency: Conduct a detailed audit of existing systems and processes, establish a MaaS working group with a clear mandate, develop a MaaS strategy and action plan, initiate dialogue with potential MaaS platform partners, and identify and prioritise the necessary investments. Create basic API documentation, conduct initial training for employees on MaaS, develop data management policies and prepare a legal framework for cooperation. Physical and digital infrastructure should be developed to promote the integration of micromobility services with other modes of transport, facilitating multimodal journeys.[54] Mobility points should be established with micromobility accessibility to provide users with real value and a smooth transition between modes of transport.

Liepaja CA: in cooperation with the Agency, assess existing regulations and improve them, ensuring the legal basis for the MaaS platform. The regulations should include the licensing of micromobility services, setting a maximum number of operators in the city to avoid overcrowding, minimum requirements for service quality, mandatory integration with the MaaS platform, and data sharing requirements in accordance with MDS standards. The necessary funding for MaaS development is identified in cooperation with the Agency. If necessary, external funding is assessed, including EU funds and other support programmes. MaaS integration into relevant planning and policy documents is also ensured, and the territory where the Maas plan will be implemented as a priority is determined together with the Agency. Together with the Agency, operational zones should be defined, specifying permitted and prohibited zones, speed limits in certain zones, such as pedestrian zones and parks, as well as night-time parking requirements. Specific targets for the integration of micromobility into MaaS platforms should also be set. International experience shows that micromobility is an effective solution to the last-mile

[53] Jittrapirom, P., Caiati, V., Feneri, A. M., Ebrahimigharehbaghi, S., Alonso González, M. J., Narayan, J. (2017). Mobility as a service: A critical review of definitions, assessments of schemes, and key challenges. Urban Planning, 2(2), 13-25.

[54] TNO (2020). *Policy options to steer Mobility as a Service: International case studies.* The Hague: TNO.

problem – approximately 30% of (e-)bike trips in the MaaS app are made within 90 minutes of using public transport.[55]

5.1.10.2 Medium-term goals (12-24 months)

Agency: launch a pilot project with the chosen MaaS platform development solution, integrate basic functionality (information, routing), test payment integration on a limited scale, collect and analyse user feedback, and iteratively improve solutions. In addition, strengthen the human resource capacity involved in the implementation and development of MaaS.

Liepāja CA: ensure strategic supervision and coordination during the implementation of the pilot project, coordinate activities with the municipality's development and mobility policy, ensure that the regulatory and institutional framework meets the needs of the pilot project, and promote the involvement of the public and partners. The CA evaluates the results of the pilot project and makes proposals for the future scaling of MaaS implementation in Liepāja and the South Kurzeme region.

5.1.10.3 Long-term vision (24+ months)

Agency: expand the range of MaaS services, integrate all modes of transport, introduce dynamic pricing and personalisation, develop B2B solutions for businesses, create loyalty programmes. At the same time, regularly update technology and, together with Liepāja CA, also infrastructure, expand the partnership network, and promote innovation through cooperation with start-up communities.

Liepaja CA: monitor the impact of MaaS service development on mobility, the environment and the economy, promote the introduction of innovation and ensure that regulations and urban planning documents are in line with new technological and market trends.

Liepāja City Council and South Kurzeme Region Council: play a key role in the creation and sustainable development of the MaaS ecosystem. Their task is not only to regulate, but also to actively promote the development of multimodal mobility. The trends identified in the Liepāja City and South Kurzeme District Development Programme 2022–2027[56] confirm the need for MaaS – more and more people with higher incomes are making the choice to live in rural areas and work remotely, therefore, the demand for convenient, flexible and individually tailored mobility is growing. At the same time, interest in owning a personal car is declining. The solutions envisaged in the development programme form the practical basis for MaaS: a new public transport system with zero-emission vehicles, mobility points with convenient transfers between modes of transport and the development of micromobility infrastructure are planned. Local government representatives must provide political support and make decisions that promote the implementation of the MaaS strategy – they must provide adequate funding and ensure that the planned solutions are consistently implemented in local government policy and development projects.

The success of the MaaS system depends on close and coordinated cooperation between all stakeholders. Studies show that when MaaS fails, it is usually due to insufficient involvement or lack of cooperation on

[55] Eno Centre for Transportation (2023). Moving MaaS 3: Helsinki Happenings. Washington DC: The Eno Centre for Transportation.
[56] Liepāja City and South Kurzeme Region Development Programme 2022–2027, p. 15.

the part of one of the stakeholders.[57] Only coordinated action involving transport operators, policymakers and users will ensure that MaaS becomes a real tool for promoting sustainable mobility, social inclusion and regional development.

5.2 Impact of MaaS plan implementation on users

Integrated or interconnected mobility solutions offer users the opportunity to travel more easily and conveniently, using a single ticket and understandable route planning. Daily commuters can combine the use of private cars with public transport, *park-and-ride* solutions and micromobility, thus saving time and money.

For tourists, MaaS offers access to public transport, car sharing and e-scooters in one place, allowing them to access places of interest and leisure facilities with a single payment and avoid more expensive services. Short-term packages (one to three days) and route maps also help tourists plan their travel.

Taxi (ride-hailing) and micromobility service users can benefit from the flexibility and opportunity to switch to a more suitable mode of transport more quickly with the MaaS service. New users, on the other hand, should start with simple starter plans and take advantage of trial offers to assess the benefits.

- Families and groups can purchase simple tickets with the option of adding additional users, while residents can purchase monthly plans with predictable transport connections and parking integration.
- It is recommended to use the real-time planner in mobility apps to choose the most efficient routes in the morning and evening hours. It is also recommended to activate safety features such as route sharing (for example, when a child is taken by taxi (ride-hailing)).

Overall, the implementation of MaaS plans promotes user convenience, safety and access to sustainable mobility solutions, while reducing the environmental and urban infrastructure burden caused by transport. It encourages a shift in public habits from private car use to shared and public solutions, improving urban mobility and quality of life. In the city of Liepāja and the South Kurzeme region, MaaS is becoming an important tool for promoting the mobility, tourism, and economic activity of residents.

5.3 Link between the research conclusions and Liepāja City Integrated Mobility Action Plan until 2035

The IMAP emphasises the role of public transport as the backbone of mobility, the importance of convenient and predictable transfers, and a simple and understandable ticketing system. The results of the study confirm that this is exactly what users want: the most highly rated conditions are an unlimited number of trips on public transport and 100% rollover of unused allowance to the next period. On the other hand, limits without the rollover of unused allowance significantly reduce the attractiveness of MaaS plans. Therefore, in plans with restrictions on the use of transport services, the rollover of unused

[57] Lyons, G., Hammond, P., & Mackay, K. (2019). The importance of user perspective in the evolution of MaaS. *Transportation Research Part A: Policy and Practice,* 121, 22–36.

allowance to the next period should be automatic, and additions should be simple and transparent. This reduces user uncertainty and promotes trust in MaaS plans.

Respondents find the three-day MaaS plan attractive and are willing to pay for it, but weekly, fortnightly and monthly plans require significant discounts – up to 4.75 *euro* per day compared to the day-equivalent price. Therefore, it is recommended to link prices and zones to the 'day-equivalent price' logic (i.e. a clear daily price as a basis from which the value for longer periods is derived). One solution would be to set a 100% rollover of unused allowance to the next period for all MaaS plans with volume restrictions and a duration longer than one week. This would already make weekly and biweekly plans sufficiently attractive compared to daily plans. The daily equivalent of a monthly plan should then be €2-3 lower than the price of a one-day plan, which is already in line with the current fare structure of public transport.

In the development of infrastructure and transport hubs, the IMAP envisages mobility points (public transport, micromobility, car sharing, *park-and-ride*). The study's conclusions call for MaaS start-up plans not to include excessive micromobility usage volumes, as additional (e-)bike minutes and taxi (ride-hailing) kilometres may reduce the choice of a MaaS plan. The recommendation is to start with small, well-considered initial volumes with the option of conveniently adding more in the app.

More information on the link between the study results and the IMAP is available in Section 7 of Appendix C (pp. 195–198).

5.4 Limitations and next steps

When interpreting the choice of a MaaS plan and willingness-to-pay indicators, it should be noted that the stated preferences may not correspond to actual behaviour, as there is a risk of hypothetical bias.

The survey was conducted in July–August 2025, and respondents may have been influenced by seasonal factors.

Low awareness of the MaaS concept may affect the consistency of responses and, consequently, their interpretation.

Certain differences identified, such as the polarisation of expenditure among tourists, indicate that a segmented approach is essential. However, the exact sizes of the sub-segments may vary depending on the data collection period or context.

Some subgroups (high spenders, micromobility users) have a small base size, so the results for these groups should be interpreted with caution.

The introduction of an unlimited number of trips on public transport and 100% rollover of unused allowance requires coordination with transport service providers and careful capacity management. The rollover of unused allowance can accumulate liabilities, so deferred service use must be taken into account in financial planning.

Finally, price scenarios assume stable market conditions, but the actual choice of plans will depend on service quality, integration and competition.

It is recommended to implement pilot projects with A/B tests to compare approaches and their impact on the choice of a MaaS plan. For example:

- the effect of different rollover proportions of the unused allowance as a function of price;
- how public-transport allowance levels and the pricing structure (including zonal tariffs) affect the choice to use public transport;
- how users respond to different e-scooter allowance thresholds and discounts;
- how household/group sharing of services works within a single household or a small group (2–3 users);
- the ease of use of tools that let users build self-configured MaaS plans.

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