Summary of current mobility status

Project deliverable D1.1

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List of abbreviations and acronyms

Acronym	Meaning
EC	European Commission
GA	Grant Agreement
GDPR	General Data Protection Regulation
KPI	Key Performance Indicator
LL	Living Lab
NSM	New Shared Modes
PT	Public Transport
SUM	Seamless Shared Urban Mobility
WP	Work Package

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Project Executive Summary

The objective of the SUM project is to transform current mobility networks towards innovative and novel shared mobility systems (NSM) integrated with public transport (PT) in more than 15 European Cities by 2026, reaching 30 by 2030. Intermodality, interconnectivity, sustainability, safety, and resilience are at the core of this innovation. The outcomes of the project offer affordable and reliable solutions considering the needs of all stakeholders such as end users, private companies, public urban authorities.

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Deliverable executive summary

Key words

Modal split, mobility status, living labs.

Summary

The SUM project intends to develop and implement solutions for an increased uptake of shared and active urban mobility. In the project there are nine different Living Labs (LLs). This deliverable describes the different LLs in terms of modal share, available shared mobility, and the cities' policies and plans for increased shared and active mobility. The results show that the LLs in the SUM project have many similarities, but also a lot of differences. While all LLs have a shared goal of increased shared and active transport, the local circumstances are very diverse. Looking at the modal share in the different LLs, it is obvious that LLs with more active travel have relatively lower usage of private cars. Shared mobility can have a big impact on the attractiveness of active mobility by making cities more walk-able and bike-able through the reduction of cars, but also by connecting bike-able or walk-able areas. Thus, we can create a positive feedback loop.

Purpose of the deliverable

A pre-requisite for measuring increase in shared mode usage in the LLs is to know the base-line usage. Given the diversity among the LLs, there are different levels of integration of shared mobility and adoption of shared mobility options but also many common points. The most important output of this task is an analytical description of the current mobility status given with indices and metrics. The LLs all do measurements of mobility in their cities in the form of e.g., travel habit surveys, manual and/or automatic counting of cars, cyclists, pedestrians, passengers on public transport, etc. These different data sources have been utilized to understand the current situation regarding traffic conditions, modal split, and integration level of sustainable mobility practices. It is important to notice that while the data provided by the LLs are often quite accurate and make it possible to see changes over time, it is difficult to compare the data between the LLs as the data collection processes greatly vary among LLs.

To facilitate the before-after comparison as well as to get specific data that is of importance to the SUM project, an additional survey has been conducted as part of WP1 (T1.1. and T1.6). The objective of this survey is to investigate the travel preferences of the citizens of each LL. These travel preferences will be collected before and after the implementation of transformative mobility measures per LL. Therefore, this survey form will uncover the changes in the mobility patterns revealing the efficiency of the selected measures. For more details on the scope and the development of the survey, the reader is referred to Section 5.

Attainment of the objectives and explanation of deviations

The objectives related to this deliverable have been achieved. The city of Jerusalem could not conduct the survey at the moment of deliverable submission, as the situation made it impossible back then. Jerusalem LL partners could run the survey afterwards, and their results have been now included.

Intended audience

The target audience for this result is primarily the members of the consortium. It is important that all partners get a good picture of the current mobility situation in the LLs, which will constitute a basis for measuring improvements throughout the duration of the project.

Structure of the deliverable and links with other work packages/deliverables

The deliverable is reporting on the current state of mobility in the 9 LLs. The deliverable is divided into 4 main chapters; modal split, integration of shared modes, applied policies and practices as well as analysis of the survey results.

The results reported in this deliverable will be used as a baseline for D5.2 assessing the impact of shared mobility modes on the different LLs.

1 Modal split in the different living labs

In the SUM project, there are 9 LLs with distinct characteristics, presenting varied challenges. Some LLs feature numerous shared mobility providers and well-developed cycling and walking infrastructure, while others contend with longer travel distances. However, cars predominate as the primary mode of transport in the cities, as indicated by Table 1.

Table 1 demonstrates the modal split in the different LLs of the SUM project. Note that the percentages presented in the table cannot fully represent the current mobility status in the LLs or be used to provide bilateral comparisons between different LLs, due to several reasons. Firstly, the results come from different surveys conducted in rather distant time periods (i.e., within time periods ranging from 2017 to 2022). Secondly, most of these surveys were national, meaning that a much wider geographical area was considered compared to the restricted geographical area of the LLs, as examined by the SUM project. Thirdly, the modal split has not been defined in the same way across all LLs. For instance, the majority of the LLs examined modal split as the average distance travelled daily per transport mode, while others define it as the number of trips performed with a given transport mode, over the total number of trips. Finally, some of the past surveys did not consider at all the availability of shared mobility modes.

For instance, the results for the **Penteli LL** come from a survey conducted in 2019 where the modal split is defined as the number of trips performed with a given transport mode over the total number of trips. For the **Munich LL**, the Modal Split refers to the percentage of average distance travelled daily, as revealed by a nationwide survey of households about their everyday traffic behaviour on behalf of the Federal Ministry for Digital and Transport (BMDV). Similarly, the results presented for the **Rotterdam LL** come from a national survey on the daily mobility of the Dutch population for the benefit of Statistics Netherlands itself, the Ministry of Infrastructure and Water Management. For the **Krakow LL**, the results are data based on the comprehensive traffic measurements which was verified and updated by surveys from 2018. The same year, a number of household surveys, interviews and various traffic counts were undertaken during the Summer and Autumn of 2018, to examine mobility status in the greater **Larnaca area**. Model split estimates for the **Jerusalem LL** are based on the travel habit survey that was conducted in the year 2017 and updated since using an activity-based transport model. The estimates refer to “Yuvalim-Ganim” neighbourhoods, the Jerusalem LL area. For the **Fredrikstad LL**, the numbers presented in the table, come from the travel habit survey for Fredrikstad conducted in the autumn of 2022 and the spring of 2023. Modal distribution for the **Coimbra LL**, is based on information obtained from the Population and Housing Census, conducted in 2021 throughout the municipality. The survey aimed at gathering information about the entire resident population, households, and the housing stock. In the **Geneva LL**, modal split estimates are based on the Mobility Survey conducted on the whole Canton of Geneva, in 2021. These figures refer to the modal split of average distance travelled daily.

In terms of modal split, most LLs exhibit that most trips are undertaken by private cars. Despite the different scope of the conducted surveys in each LL, as previously explained, analysing the data with respect to the different modalities reveals an interesting conclusion. For cases where relatively lower percentages of car usage appear, such as the cases of Munich (34%) and Krakow (40%), we observe a significantly higher utilization of different active modes such as walking and cycling.

Table 1: Modal split (in %) in the different living labs.

	Car	Motorcycle	Public transport	Active travel	Walking	Cycling	Other
Penteli	69,04	2,65	18,24		9,22	0,84	
Munich	34		24		24	18	
Rotterdam (NL)	71,4		2,9		2,8	7,5	Train 9,2 Moped 0,5
Krakow	39,5		29,7		22,8	6,9	1,1
Larnaca	88,5	1,7	1,8				Other: 3,6 Non-motorized: 4,4
Jerusalem	66		18		12.5	0.5	3
Fredrikstad	63,5	0,3	4,9		17	4,6	1,1
Coimbra	73,8		13,8		11,1	1,3	
Geneva	62	4	23	11	7	4	

Sources:
- Penteli: ΔΗΜΟΣ ΠΕΝΤΕΛΗΣ | ΣΒΑΚ; https://doi.org/10.1007/978-3-030-61075-3_2
- Munich: https://www.infas.de/publikationen/mobilitaet-in-deutschland-mid-methodenbericht/
  Rotterdam: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksomschrijvingen/onderzoek-verplaatsingen-in-nederland--ovin--
- Krakow: Nr 5/2015 r. – Urban and Regional Transport (TMiR)
- Larnaca: https://sustainablemobility.cy/wp-content/uploads/2022/04/5.WP13_SUMP_Summary_EN_HR.pdf
- Jerusalem: About - תוכנית אב לתחבורה
- Fredrikstad: Fredrikstad Municipality - Travel habits survey
- Coimbra: Statistics Portugal - Web Portal
- Geneva: Population's mobility behaviour in 2021 (results of the microcensus)

2 Integration of shared mobility

The SUM LLs have different types of shared mobility solutions. Some of the LLs only offer traditional public transport and taxi services as shared alternatives, but most of the LLs have a plethora of different new shared mobility solutions. In this section, the different LLs are presented with respect to the availability of shared mobility modes.

Munich

Munich has a strong public transport system that is connected to the greater Munich area and includes buses, subways, suburban trains, and trams. In addition to its extensive public transport network, a wide array of shared mobility options, including car-sharing, bike-sharing, electric moped-sharing, and scooter-sharing, is available throughout many parts of the city. The city hosts four providers of shared bicycles (Call a Bike, MVG Rad, TIER Pedelecs, Bolt), one electric moped-sharing company (Emmy), four providers of shared e-scooters (Lime, Bolt, TIER, Voi), three cargo-bike sharing providers (Freie Lastenradl, sigo, evhcle), seven car-sharing providers (Flinkster, Miles, ShareNow, Sixt share, Stattauto, CarVia, Scouter), two carpooling organizations (BlablaCar, Mitfahrzentrale), two ride-hailing companies (Uber, Bolt) and traditional taxi services (Taxi München e.g.)

Furthermore, Munich features a Mobility-as-a-Service (MaaS) provider “MVGo”, facilitating the booking and payment of mobility services from micro-mobility providers. This MaaS provider also serves as a ticket shop for public transport and offers a multimodal routing service.

Geneva

Geneva is a vibrant city and canton in Switzerland. It is home to several international organizations, a renowned financial marketplace, and a global cluster of technological innovation. Its physical proximity to France, its geological location between mountains and the Lac Léman, and its sustained population growth already surpassing 1 million inhabitants in the metropolitan area “Greater Geneva” have led to state-of-the-art transnational public transport. Geneva has constantly ranked as one of the most liveable cities in the world according to the Economist Intelligence Unit which considers stability, healthcare, culture, environment, education and infrastructure.

Transport in Geneva is characterized by a dense and ambitiously growing public transport network featuring busses, trolleybuses, trams, urban / regional / long distance trains as well as local boats (“mouettes”) crossing the Lac Léman (modal split distance wise: 23% in 2021). The road network is functional but quite congested: according to 2021 TomTom congestion ranking, Geneva is the 75th most congested city in the world. On the other hand, there is a strong share of active modes (mode split distance wise in 2021: 11%) and a broad and constantly growing offer of new and shared mobility services, which includes human-driven on-demand busses, autonomous shuttles, bike-sharing (Donkey Republic) and carsharing (Mobility).

Jerusalem

Jerusalem is one of the most unique cities in the world. attracting significant tourism, especially related to pilgrimage. Jerusalem has almost a million inhabitants with generally lower incomes than the average. Jerusalem’s neighbourhoods vary greatly, covering nearly the whole range on the socio-economic scale. As severe traffic plagues the city six hours a day, residents rely heavily on public transit, which is of high-quality but lacks alternative choices. Historically, the Jerusalem Transport Master Plan Team (JTMT) has focused on public transport, for example Jerusalem’s light rail provides 170,000 trips a day and the municipal bus system, which expanded last year to 1,200 buses across three operators. The area of Yuvalim Ganim serves as the Jerusalem LL. In this area there are public transport in the form of Buses (Egged, Superbus) and trams (Kfir). There is one bike sharing company (Jeru-Fun), one car-sharing company (Car2go), and a carpooling scheme (Waze).

Penteli

The shared mode available in Penteli now are public transport in the form of buses (Metropolitan Authority - OASA) and taxis (FreeNow and independent taxi drivers). There are plans to introduce shared electric bicycles and a car-sharing scheme during the project.

Rotterdam

Rotterdam has a public transport network with buses, Metro and trams, all operated by RET. Since 2019 RET has started collaborating with shared mobility providers. Another company, Arriva, operates bus services in certain areas of Rotterdam and its surrounding regions. They are primarily responsible for regional bus routes connecting Rotterdam with nearby towns and cities. However, in suburban areas of of Nootdorp, Langsingerland, Maassluis and Alexander Polder, the social norm tends to lean towards a higher reliance on private vehicles for transport due to factors such as limited public transport infrastructure and perceived convenience. Furthermore, there are five companies operating different bike sharing services (Donkey Republic, Lime, Vaimoo, BaQme, OV fiets). Cycling is deeply ingrained in Dutch culture, and many residents of Rotterdam choose to use bicycles as their preferred mode of transport. There are also three car-sharing companies operating in the city (Mywheels, Sixt Share, Greenwheels), as well as three e-scooter sharing services (Felyx, Check, Go Sharing). Below is detailed introduction on some of shared mobility operators:

1. OV-fiets is a bicycle rental service in the Netherlands provided by NS (Nederlandse Spoorwegen), the national railway company. It offers yellow bicycles for rent at train stations and is designed to complement public transport by providing a convenient and affordable option for short-distance travel. Users can rent bicycles using their OV-chipkaart, a smart card used for payment in public transport. OV-fiets has gained popularity among commuters and travellers who use it for last-mile transport, helping promote sustainable mobility and reduce congestion in urban areas.

2. Felyx offers electric scooter-sharing services in Rotterdam. Users can locate and rent electric scooters through a mobile app, providing a convenient and eco-friendly mode of transport within the city.

3. Greenwheels is a car-sharing service available in Rotterdam. They offer a fleet of shared cars that can be rented by registered members for short periods, providing a flexible alternative to owning a private vehicle.

4. MyWheels offers a wide choice of cars, and you always get a fuel card and a charging key. Donkey Republic operates a bike-sharing platform in Rotterdam. Users can rent bicycles through their app and access them from various locations in the city, promoting sustainable and healthy urban mobility.

5. Go Sharing is a provider of electric moped-sharing services. Users can rent electric mopeds through the app and ride them for shorter trips within Rotterdam, combining convenience and zero-emission transport.

As the biggest provider of shared transport and micro mobility, Lime currently operates 500 shared electric bikes in Rotterdam, making it a great complement to public transport in the city. Rotterdam is a bike-friendly city with a well-developed cycling infrastructure.

Krakow

In terms of shared mobility, Krakow has a public transport network with buses and trams. There is also bike sharing scheme (park-e-bike) and long-term public bike rental, three car-sharing providers (Traficar, Panek, Kayak), and three shared e-scooter providers (Bolt, Tier, Lime). Furthermore, there is demand-responsive transport in the form of Telebus, two ride-hailing companies (Uber, Bolt) and Taxi.

Fredrikstad

Fredrikstad is situated around water and thus has a public transport system that not only consists of busses (operated by ØKT), but also a Water Metro (Byferga). In addition to the public transport network there are a bike sharing company (Sharebike), a car-sharing company (Move About), as well as shared e-scooters (Bolt, Ryde and Voi). There are also demand responsive transport (ØKT, Flex), and two taxi companies (Taxisentralen, Ferder Taxi).

Larnaca

The city of Larnaca is the third largest city of Cyprus located on the south-east side of the island. Inside the administrative boundaries of the city, the largest airport of the island is located along with the second largest port of the island. The only available public transport in Larnaca is the bus network which provides an alternative choice for mobility to the residents of Larnaca, with lines designed in light of the city's structure. Currently, no other shared modes are available, fact that challenges the goals of the project on achieving an increase on the use of alternative modes (e.g., shared modes, such as e-bikes).

Coimbra

In Coimbra, the public transport network consists of buses (operated through the municipal transport authority of Coimbra - SMTUC and the private operator Transdev), trains (operated by CP - Comboios de Portugal), and the implementation of the Metrobus system is currently underway.

With the aim of simplifying payment, promoting the use of different modes of transport, and providing convenience to users by facilitating the transition between different modes of transport within a unified system, fare integration is being developed in the Coimbra region.

There is one bike sharing operator (Bolt) and two shared e-scooter companies (Bolt, Link). Moreover, there is traditional Taxi (Politaxis), as well as ride-hailing (Uber, Bolt).

The Municipal Urban Transport Services of Coimbra (SMTUC) provides a Special Transport service for all individuals with reduced mobility who cannot use regular public transport routes, especially those using wheelchairs. This service operates on a door-to-door basis, requiring prior admission to the service. Since 2003, for the first time in Portugal, a public passenger transport line has been implemented with mini electric buses that stop upon the customer's signal along the route, allowing passengers to board and alight wherever they wish. This line travels through the historical zone, connecting the Upper Town (Alta) to the Lower Town (Baixa), a UNESCO heritage site.

3 Scheduled and applied policies and practices to promote shared mobility

All LLs in the SUM project have quite ambitious goals in terms of sustainable urban mobility in their Sustainable urban mobility plans (SUMP). An important part to reach those goals is an increased share of the city travel to be done by shared modes of transport. In this section, the SUM LLs are described in terms of their policy to promote shared mobility.

Munich (subject to change due to the amendment process)

Current State: Munich's Mobility Strategy 2035 (SUMP) focuses on accessibility, enhancing public space quality, improving transport efficiency, safety and increasing public transport modal share to 30%. Aligned with the European Green Deal, Munich aims for 100% climate neutrality by 2035. In 2022, the City Council passed a resolution for the first stage of a shared mobility strategy until 2026, which is integrated into the SUMP 2035. Overall goal of the resolution is to develop a city-wide service level for shared mobility offers. The central starting point for this is better networking of mobility offers with each mode, the intersection with urban and open space planning, the cooperation of the city and the surrounding area as well as the implementation of suitable push and pull measures.

Objectives: Munich's mobility strategy includes a combination of regulatory ("push") and supportive ("pull") measures:

- Push measures:
  - Introduction of parking charges and tighter parking supply management
  - Expansion of 30 km/h speed zones
- Pull measures:
  - New and extended bike lanes and "bike streets"
  - Development of Park & Ride and Bike & Ride facilities
  - Dedicated parking for car-sharing and micro-mobility options

A core initiative is also the deployment of 200 modular "Mobility Hubs" ("Mobilitätspunkte") by 2026. The mobility hubs, which are installed mainly on former parking spots, provide access to various mobility modes, emphasizing mandatory criteria of accessibility, safety, longevity, and weather resistance. This modular system allows customization based on local conditions, enhancing access to shared mobility and overall liveability.

Planned Actions within the scope of the SUM project: The overarching goal for the Munich LL is to expand the features of mobility hubs through additional offerings. Further, the integration between new shared mobility and public transport is intended to be promoted. Therefore, the focus of the LL in Munich is on designing a concept for a fully autonomous vehicle fleet with a strong focus on the integration of the fleet with the mobility hubs. This includes the clarification of legal and operational issues, price points and operating strategies. The focus will also be on the following steps:

1) Analysing operational data from the SIXT Ride app to model the seamless integration of an autonomous vehicle fleet into both existing and planned mobility hubs within Munich's public transport network.
2) Conducting simulations to assess the impact of an autonomous fleet on traffic conditions in Munich.
3) Optimizing the allocation of future mobility hubs in Munich to enhance the effectiveness of autonomous ride-hailing services, ensuring convenient access and efficient service coverage.

4) Identifying essential infrastructure requirements to establish mobility hubs as reliable pick-up and drop-off points for autonomous ride-hailing.
5) Investigation of the potential integration of charging points at mobility hubs into Munich's public charging infrastructure expansion strategy.
6) Validating and parameterizing the open-source simulation framework FleetPy, with a focus on investigating operational strategies and seamlessly integrating new and shared mobility services into Munich's existing public transport framework.
7) Developing and implementing surveys targeting potential users, aiming to identify and evaluate acceptance levels and potential barriers associated with the adoption of new and shared mobility services in Munich.

Geneva

Current State: In Geneva, the Cantonal Climate Plan was recently established to strengthen and coordinate all initiatives to lower greenhouse gas emissions. It includes objectives for transport and other sectors, and involves all relevant local actors (public authorities, private sector partners, as well as the population). The plan targets a 60% reduction in greenhouse gas emissions by 2030 and carbon neutrality by 2050 at the latest.

Objectives: In alignment with the Cantonal Climate Plan, Geneva is committed to:

- Enhancing intramodality by improving integration between public transport and NSM,
- Promoting shared and on-demand mobility solutions,
- Reducing reliance on private vehicles, especially in less-connected areas,
- And optimizing urban logistics to improve freight efficiency and reduce emissions.

The deployment of mobility hubs and the integration of passenger and freight transport through shared resources are central to this strategy. These efforts will serve both environmental and mobility goals, making sustainable transport more accessible and convenient across the canton.

Planned actions within the scope of the SUM project: Geneva LL aims to contribute to achieving the cantonal climate plan in two ways:

1) First, by developing mobility hubs. Currently, public transport and NSM coexist in a non-integrated way. For the traveller, this means adapting to different signage systems, different smartphone applications, etc. The idea of the mobility hubs is to integrate the physical dimension, i.e. the signage systems, by introducing one overarching and integrated signage system at major interchange stations and also at isolated stations in suburban areas, where alternatives to car use are lacking. This way, travellers could easily combine NSM and public transport and shift from car usage towards more sustainable transport modes.
2) The second action is to integrate people and freight transport by employing an optimized on-demand delivery system using vehicles dedicated to on-demand passenger transport. Geneva currently operates two different types of on-demand mobility: human-driven on-demand buses in the rural parts (“Champagne”), and autonomous shuttles in the urban area (“Belle-Idée”). The autonomous shuttles were developed, tested and deployed within the context of the H2020 AVENUE project and just received follow-up funding from the European Commission and the Swiss government in the context of the ULTIMO project to extend the service towards a second area.

Jerusalem

Current State: Jerusalem faces several unique challenges and opportunities in urban mobility, shaped by its rapid population growth, geographic constraints, and socio-economic diversity. The policies to be applied in order to promote the shared mobility are going to be affected by the following aspects:

1. From 2011 to 2020, annual rate vehicle increases of 4.3% with an annual population growth rate of approximately 2.1% and an increase of the number of vehicles by 46% (83,845 vehicles).
2. A total of 175,000 cars enters every day and 250,000 enter the expanded city centre.
3. Jerusalem's intercity train to Ben-Gurion International Airport and to Tel Aviv (2,670,000 trips in 2019).
4. The only mass transport line carries 170,000 trips a day (37 million trips in 2021). The line, which is currently 13.5 km, will expand in 2023 to the north and to the west.
5. In 2021, on a regular weekday the public transport system provides 12,000 bus trips and 300 LRT trips (morning peak hours: 710 bus trips, 22 LRT trips).
6. Jerusalem's light rail stations are accessible by foot, bike, bus, and private car (in Park & Ride locations like Ammunition Hill and Mount Herzl). About 10-15% of the city's residents and workers live less than 300m from a station and about 20-25% live less than 600m from a station.
7. Bicycle lanes: Mainly due to the introduction of electric bicycles and electric scoot, the city has 60 km of bike paths now, will have 80km by the end of 2022, and 180 km by the end of 2026.
8. In Jerusalem, 5 shuttles help residents in six remote residential neighbourhoods reach two employment centres twice a day (morning and evening).

Objectives: The Jerusalem SUMP targets a model split of 36% walking and 5% cycling. The Jerusalem SUMP team adopted the following sustainable urban mobility indicators to identify the strengths and weaknesses of the system and to highlight areas in need of improvement:

i) Affordability of public transport for the poorest com
ii) Accessibility of public transport for mobility-impaired communities
iii) Air pollutant emissions
iv) Noise hindrance
v) Road death
vi) Access to mobility service
vii) Greenhouse gas emission
viii) viii)Congestion and delay
ix) Energy efficiency
x) Opportunity for Active Mobility
xi) Multimodal integration
xii) Satisfaction with public transport
xiii) Traffic safety active modes

Planned actions within the scope of the SUM Project: Jerusalem is implementing a combination of push and pull measures to address its growing mobility demands and environmental goals:

- Push interventions include:
  - Transitioning selected streets to pedestrian-only zones,
  - Reducing parking allocations in new residential developments,
  - Expropriating over 250 parking spaces for the construction of a new light rail line.

- Pull measures aim to enhance sustainable and shared mobility through:
  - Dedicated HOV lanes on two key entry corridors,
  - Expansion of Park & Ride facilities (600, 550, and 250 spaces near LRT stations),
  - Elevators and conveyors to promote walking in hilly terrain,
  - Two new light rail lines under development,
  - Designated parking spaces for shared vehicles,
  - Reduced-speed lanes marked with bicycle symbols,
  - Discounted public transport fares for children and senior citizens.

Penteli

Current State: The Municipality of Penteli is actively working to create a more vibrant, accessible, and livable urban environment through sustainable transport planning. It has recently launched its first Sustainable Urban Mobility Plan (SUMP) and an Electric Vehicle Charging Plan, demonstrating a strong commitment to future-oriented mobility strategies.

Penteli prioritizes citizen participation through transparent consultation processes that aim to capture the needs and expectations of all residents. A particular emphasis is placed on improving road safety, especially around schools and dangerous intersections, as well as on the gradual development of a citywide pedestrian and bicycle network. The SUMP identifies several key mobility priorities:

- Reducing energy use, air pollution, and transport-related noise, while improving the urban microclimate,
- Connecting green spaces to active transport modes,
- Enhancing accessibility for vulnerable users and reducing social exclusion,
- Promoting the integration of smart technologies into the public transport system,
- Improving road safety as a core element of mobility planning.

Objectives: The Municipality has outlined a series of immediate and strategic projects to improve accessibility, safety, and sustainability:

- Installation of electric vehicle charging stations at key urban locations,
- Traffic calming and pedestrianisation interventions along the Penteli–Chalandri Creek, including pedestrian bridges and crossings,
- Redesign and redevelopment of pedestrian and cycling infrastructure across the city,
- Introduction of shared spaces and traffic calming areas to support safer, low-speed environments,
- Accessibility upgrades, including ramps at intersections and tactile paving for the visually impaired.

In parallel, the Municipality will redefine the road hierarchy to give greater priority to alternative and sustainable transport modes.

Planned actions within the scope of the SUM Project: Penteli aims to establish a multimodal mobility ecosystem by integrating shared mobility services (bike, scooter, and car-sharing) and strengthening public transport options. Key initiatives include:

1) Reintroduction of local bus lines, coordinated with Metropolitan Authority (OASA) services and using an integrated ticketing system,
2) Establishment of mobility hubs where public transport and shared mobility services are co-located and seamlessly connected,
3) Strategic planning for shared vehicle parking and access, to support the growth of shared-use systems.

These actions will support Penteli's broader goal of fostering a sustainable, connected, and inclusive urban mobility network.

Rotterdam

Current State: The City of Rotterdam is actively advancing policies to support sustainable and inclusive urban mobility. As part of this effort, the city is prioritizing the development of dedicated parking areas for micro-mobility and the establishment of priority corridors for public transport to improve service speed and reliability. These steps are part of a broader strategy to enhance multimodal transport and reduce dependence on private vehicles. A central element of Rotterdam's approach is the expansion of Mobility Hubs across the city. These hubs provide seamless access to a range of shared mobility services such as car-sharing, bike-sharing, and on-demand transport options. Key pilot locations for these hubs include Central Station, Beurs, and Zuidplein, developed in close cooperation between RET (public transport operator), the municipality, and private shared mobility providers.

Objectives: To strengthen shared mobility and promote the efficient use of multimodal infrastructure, Rotterdam plans to implement the following actions:

- Implementation of dedicated parking areas for micro-mobility vehicles, enabling safer and more organized urban spaces,
- Expansion of the mobility hub network throughout the entire city area, providing multimodal access points and supporting last-mile connectivity,
- Ensuring infrastructure elements at hubs meet the requirements for universal accessibility, safety, and resilience,
- Applying a modular design system for mobility hubs, which allows tailored deployment depending on neighbourhood characteristics and user needs.

These actions are designed to not only facilitate mode shift but also to contribute to improved quality of life in the urban environment.

Planned actions within the scope of the SUM Project: Rotterdam will deploy an advanced data-driven approach to predict, plan, and promote shared mobility services. Scheduled measures include:

1) Selection of mobility hub locations, identification of micro-mobility operators, and the processing of demand/supply data related to mobility services.

2) Development and calibration of a self-learning prediction model that estimates the likelihood of mobility service availability using probability ranges (e.g., 0–25%, 25–50%, 50–75%, 75–100%).

3) Creation of a demand prediction API that will be integrated into a multimodal travel planner, enabling smarter, real-time mobility choices.

4) Pilot testing of a mobile app that allows users to access mobility services and provide feedback, which will be used to refine the prediction system.

5) Distribution of the API to MaaS (Mobility-as-a-Service) providers, to foster seamless integration of shared mobility within existing digital platforms.

Krakow

Current State: Krakow is in the process of preparing a SUMP, which will be adapted in the second part of the 2023/first part of the 2024. The priorities/objectives of the SUMP for Krakow Metropolitan Area are:

- Improving the level of cooperation between transport organizers and other entities in the Krakow Metropolis leading to the implementation of coherent activities towards the integration of transport systems.
- Improving the timeliness and reliability of the process of obtaining and analysing data (also as part of social participation) regarding the entire transport system, including knowledge of psychological aspects, influencing the transport / communication habits and behavior of residents.
- Improving the conditions for pedestrian traffic and the attractiveness of streets and sidewalks as public spaces.
- Improving the conditions for bicycle traffic (development of infrastructure ensuring the coherence of the bicycle network in the local and metropolitan dimension and connection with the public transport system)
- Further development of innovative services in the field of electromobility and shared mobility,
- Reduction of the number of victims of transport accidents along with the creation of conditions enabling the implementation of the assumptions of "vision zero" (zero killed and seriously injured as a result of traffic accidents)
- Increasing the safety level of vulnerable road users in relation to road traffic, viii) Integration of the needs of various social groups and their divergent expectations (age, material status, lifestyle, health, family and work conditions),
- Reduction of the noise level and emission intensity of the transport system, including solutions leading to limiting car traffic in the centre of Krakow and the number of cars entering Krakow from the Metropolis area.

Although SUMP is not yet implemented, Kraków has taken actions to achieve SUMP's goals:

- In 2022 the City Council passed a resolution for the first in Poland Low Emission Zone (LEZ) which involve all City of Krakow area. The first LEZ requirements will come into force on July 1, 2024, and the full version of them – two years later on July 1, 2026. Only vehicles that meet the requirements set out in the resolution will be able to enter the LEZ (for details see https://ztp.krakow.pl/en/lez/lez-requirements) These solutions should limit emission of NOx and dust by 82% from transport and improve air quality.
- In 2023, Krakow started a long-term public bike rental called LajkBike. For users Krakow bought 500 standard bikes and 500 electric bikes.
- In 2023 the City Council passed a resolution about tariff integration. From August 2023 citizens can buy one monthly ticket for public transport in Krakow, cities around Krakow and for regional trains. This kind of tickets is additional because it is possible to buy ticket only for PT in Krakow.

Future challenges include:
- better transport management in city especially after implementation of SUMP.
- improved accessibility, comfort, punctuality, reliability of PT
- systematic develop a system of bike roads and pedestrian paths.
- development of Park-and-Ride facilities and transfer hubs.

Objectives: Kraków anticipates further major developments to align fully with its future SUMP goals, including:
- Better urban transport management, especially after SUMP implementation,
- Enhanced accessibility, comfort, punctuality, and reliability of public transport,
- Systematic expansion of bike lanes and pedestrian pathways,
- Development of Park-and-Ride facilities and multimodal transfer hubs to facilitate seamless travel,

- Measures to reduce private car use, particularly in the city centre.

These initiatives support the long-term goal of creating a safer, cleaner, and more integrated transport network for the metropolitan area.

Planned actions within the scope of the SUM project: The focus of the LL is on the improved accessibility. It means on the one hand better public transport offer in LL area, on the second-hand better information and integration between different modes of transport. We aim to create complete project by:

1) Low waiting time for vehicle (few minutes),
2) Easy to use mobile app offering integration with regular buses, trams and trains lines,
3) Quick transport from LL area to nearest hub for change (tram or train).

Fredrikstad

Current State: Fredrikstad is undergoing a major urban development with a new city centre area planned to accommodate around 12,000 new inhabitants. This area will feature new water metro stops and shared electric ferries, building on Fredrikstad's pioneering role as the operator of the world's first fully electric passenger ship with inductive charging since 2019.

The city faces a key mobility challenge: reducing the number of car trips to meet its climate goal of 0% growth in greenhouse gas emissions, despite population growth. Currently, 63.5% of journeys are made by car—well above the national average of 53%. Public transport usage is low, with only 4.9% of trips by bus (national average 11%), and cycling accounts for 4.6% (national average 11%).

Fredrikstad does not yet have a formal Sustainable Urban Mobility Plan (SUMP), but it is in the initial phase of development pending city council approval. The municipality has multiple plans related to mobility, including the broad Bypakke Nedre Glomma—a multi-year regional mobility improvement partnership involving state road and rail authorities, the county, and neighbouring Sarpsborg municipality. The current phase targets:

- Zero growth in climate emissions despite rapid population growth,
- Increasing sustainable transport mode share,
- Improving public and commercial transport accessibility,
- Developing more efficient traffic hubs,
- Promoting walking and cycling trips.

Objectives: Fredrikstad has implemented several **push and pull measures** to encourage sustainable mobility:

- **Push measures** include converting free parking into paid parking at higher rates, introducing toll roads, limiting car access and parking by converting some roads into bicycle lanes, and creating underground parking to reduce street parking.

- **Pull measures** include free water metro and city ferry services with increasing availability, bus lanes on busy streets, transitioning the bus fleet to electric buses aiming for zero emissions by 2040, integrated multimodal ticketing, and reduced public transport fares for monthly cards since 2019.

Examples of push interventions implemented in Fredrikstad are converting free parking to paid parking at a higher rate, the introduction of a toll road, limiting roads and parking for cars (including converting part of roads into bicycle lane), and creating parking spaces underground to get cars off the street. Pull interventions that has been introduced recently are Free water metro / city ferries with increasing availability; Bus lanes in highly trafficked street; Changing of public buses fleet towards electric buses (goal is zero emission in 2040); Multimodal integrated ticketing for public transport Reduced fare for monthly public transport cards since 2019; Bike-sharing system in the city with 65 bikes covering 10 stations (GIRA; Two shared kick bike companies operating 350 units in the city (Bolt and Surf); Bicycle lanes and bicycle "hotels" next to transport hubs; Park and ride areas close to transport hub; The municipality of Fredrikstad operates a fleet of electric cars for its internal and public services.

Planned actions within the scope of the SUM project: Fredrikstad LL will focus on the city ferries and its water metro offering in general, and specific R&D&I will use a new project already underway as its main focus. The project intends to test a new route for the city ferries, between the island of Kråkerøy, and the industrial area of Øra with its 2500 workers. The test will last for 12 months and aims to learn how popular the line will be, how it will impact the city ferries transport system and the larger urban mobility system in the city. It is also a first test of a new ferry which will be autonomous. In an ongoing, adjacent project funded by the Norwegian Research council, we are also testing a public-facing robot for security aspects, as well as communication needs passengers may have. Involve passengers and employers in the Øra industrial area in the new line in order to increase the number of employees that will switch from taking their cars to work, to choosing a combined journey that involved the new ferry line. We will collect information and seek to co-create push and pull measures together with employers and employees.

Larnaca

Current State: The continuous increase of car dependency inside the city of Larnaca has escalated the current mobility problems of the city (e.g., congestion). Therefore, the city's targets are focusing on improving the current mobility status inside the city by promoting alternative modes of transport such as public transport, share modes and other. The current operator of Larnaca's public transport is the company "Larnaca Public Transport" who provide consistent services during night times and weekends. Also, closer to the city centre, the frequency of the service is increasing. Regarding Larnaca's bicycle network it should be mentioned that it has only a limited cycling infrastructure in place and a relatively low mode share. However, based on the SUMP, the city is pointed to the direction of investing towards the expansion of the existing network and connecting the most used facilities city-wide. As for the parking issues is facing (e.g., illegal on-street parking) does not support the process of reducing personal car dependency and increase the use of alternative modes which will help the city to achieve its goals.

Objectives: Larnaca's Sustainable Urban Mobility Plan (SUMP) targets five high-level objectives:

- Economic efficiency: improving cost-effectiveness of the transport network
- Environmental sustainability: minimizing emissions
- Accessibility and social inclusion: ensuring all citizens have transport options
- Safety: enhancing security within the transport system
- Quality of life: increasing attractiveness and quality of the urban environment

Planned actions within the scope of the SUM Project: The Larnaca Living Lab will introduce new shared mobility modes, such as e-scooters, to increase sustainable travel options. Efforts will also focus on integrating public transport with these shared modes through the implementation of a Mobility as a Service (MaaS) platform. These pull interventions aim to shift the current modal split by encouraging greater use of shared mobility and public transport, supporting the city's overall sustainability goals. Planned improvements include expanding the bicycle infrastructure to better connect important facilities, addressing parking challenges to discourage illegal and excessive car use, and enhancing the urban bus network to better serve those currently not using public transport.

Coimbra

Current State: Coimbra, with over 140,000 inhabitants and a seasonal population reaching approximately 200,000, is the largest municipality in Central Portugal's Beira Littoral region and a major hub for interregional bus services. Despite its size, the current modal split shows only 7.8% of trips are made by private car, significantly below the city's target of 43%. The city has faced a continuous increase in motorization, which it aims to reverse.

Challenges include low population density, dispersed housing, and lack of integrated ticketing, leading to "white spots" where residents live more than 600 meters from public transport networks, hindering public transport uptake.

Objectives: Coimbra aims to improve the efficiency, effectiveness, and fairness of transporting people and goods, while reducing negative impacts such as air pollution and greenhouse gas emissions. Key planned interventions include:

- Implementation of an integrated ticketing system to simplify public transport use
- Development of mobility hubs to support seamless multimodal travel
- Introduction of new electric buses to modernize and decarbonize the public transport fleet
-

These actions aim to promote a balanced modal shift, increasing the share of public transport, non-motorized modes (NSM), and walking to 56%, improving accessibility for all citizens, and minimizing environmental and health impacts.

Planned actions within the scope of the SUM Project: Coimbra focuses on facilitating the modal shift by enhancing multimodal integration and accessibility. The creation of mobility hubs and introduction of electric buses will be key elements, alongside the roll-out of the integrated ticketing system. Together, these efforts are expected to increase public transport use and sustainable mobility, contributing to the city's broader goals of reducing private car dependency and improving urban liveability.

4 Survey Development

4.1 Objective

The objective of the survey is to investigate the travel preferences of the citizens of each LL. These travel preferences have been collected before the implementation of the transformative mobility measures and will be collected again after the implementation of the mobility measures per LL. Therefore, this survey form aims at uncovering the changes in the mobility patterns revealing the efficiency of the selected measures in each LL. The survey development is linked with the following tasks within WP1:

- T1.1. Ex-ante measurement of shared mode usage of LLs
- T1.2. Specification of LL needs

Additionally, in this survey, the social acceptance of present and future transport policies are examined as part of T1.6 “Acceptance assessments”. Based on this task, participants evaluate the transport system of their city. Their evaluation is based on their perceptions which determine social acceptance. This survey acts as a tool to collect these responses and compare, i.e., before and after. In this deliverable, the current mobility status of each LL before the implementation of the proposed measures, is investigated.

The survey form consists of four main sections:

- Travel behaviour and familiarity
- Collection of travel diaries
- System evaluation and Social Acceptance
- Socio-demographic characteristics

The developed survey has been carried out in all LLs. The survey was created as a joint effort by the SUM project team to cover all different questions that the project plans to answer. The survey form was developed in English at the first stage and then it was translated to 8 different languages: German, Greek, Hebrew, French, Dutch, Polish, Portuguese, and Norwegian. The LLs were responsible for translating the survey form. Hence, some adjustments were inevitable. Nevertheless, all datasets can be combined into a unique set of data used by the SUM project. Data segments will be shared through the Pan European Open Data Platform that is being created in T1.5. Overall, the goal was at least 200 answers per LL at the end of the ex-ante measurement period, i.e., June 2024. Overall, the survey includes 30 questions, and it takes approximately 15 minutes to complete. In the following, we present the text from the survey introduction.

“This survey is being conducted as part of the project Seamless Shared Urban Mobility (SUM), funded by the European Union's Horizon Europe research and innovation program (Project 101103646).

The objective of SUM is to transform current mobility networks towards innovative and novel shared mobility systems integrated with public transport in 15 European Cities by 2026 and 30 European Cities by 2030. The project work will improve sustainable mobility and help decrease the emissions coming from transport.

The participating cities that act as LLs in this project are 1) Munich, Germany, 2) Geneva, Switzerland, 3) Jerusalem, Israel and 4) Athens - Penteli, Greece, 5) Rotterdam, Netherlands, 6) Krakow, Poland, 7) Fredrikstad, Norway, 8) Larnaca, Cyprus and 9) Coimbra, Portugal.

Great news!! Your city is one of the Living Labs. This means that in the next months, innovative shared mobility measures and strategies will be implemented and important interventions in the road infrastructure will take place. So now, we kindly ask you to participate in this process and help us. In this survey, you can *describe your current travel preferences, evaluate the transport system, and assess the implemented transport policies.*

In - CITY, COUNTRY -, the survey is conducted by the - HOST INSTITUTION OF EACH LIVING LAB -. It consists of 4 sections, namely: 1) Transport system evaluation, 2) Social acceptance of shared mobility modes, 3) Collection of travel diaries, and 4) Socio-demographic characteristics."

Each Living Lab (LL) was free to deploy the survey using a platform of their choice, provided it was covered by an existing agreement with the respective partner organization. Although different platforms were used, the survey content remained consistent across all LLs to ensure uniformity. The platforms selected were all compliant with EU General Data Protection Regulation (GDPR) standards. Specifically, Microsoft Forms™ (https://forms.office.com) was used by Athens-Penteli, Munich, Geneva, Coimbra, and Jerusalem; Qualtrics™ (https://www.qualtrics.com) by Rotterdam; MOBYApp™ (https://mobyapp.eu) by Larnaca; ArcGIS Survey123™ (https://survey123.arcgis.com) by Krakow; and SurveyXact™ (https://www.surveyxact.com) by Fredrikstad. The above given links were all accessible in May 2025.

4.2 Survey design methods and techniques

The survey was designed as a revealed preferences survey form, where the objective is to record the travel behavior of LL citizens before and after the implementation of transformative measures. The method of revealed preferences is leveraged in transport research to uncover and scrutinize prevalent mobility patterns. Conducting research using this method is straightforward, especially in terms of the questions presented to participants. The collected data stems from questions that mirror real-world situations and choices the respondents have made in the past. One of the primary outputs of this methodological approach is travel diaries, which lead to the creation of origin-destination matrices. Below we present some advantages of this method:

- It captures genuine choices, mitigating the chances of discrepancies that might skew results.
- Its design process is uncomplicated, given the clear objectives of each study.
- The results produced have a specific time reference, making them comparable across periods or even different cities and countries.

However, the method also has its shortcomings:

- A limited variance among observed features can hinder the isolation of specific variables for impact analysis.
- Potential correlations among independent variables can lead to multicollinearity, complicating the relationships between cause and effect, and at times rendering model calculations unfeasible.
- The method isn't adapted to projecting behavior changes in response to future interventions.
- A sizable and well-stratified sample is essential to capture the full spectrum of behaviors.
- There's an inherent risk of infringing upon individual privacy, necessitating explicit consent from participants.

In past research, questionnaires based on revealed preferences have proven invaluable, especially studies focusing on Public Transport and its dynamic services (Akrioti et al., 2021; Awad-Núñez et al., 2021; Hansson et al., 2019; Krueger et al., 2019). In this context, the method provides insights into the correlation between mobility preferences and the geographic locations of homes and workplaces.

4.2.1 Quick travel diaries

A standardized form was utilized to quickly collect travel diaries in the LLs. We designed the form to chronicle a maximum of 5 trips made by an individual in a day, starting invariably from their home (Figure 1). Indeed, the destination of a particular trip becomes the starting point for the next. This approach offers a continuous understanding of an individual's movement pattern throughout the day (i.e., a trip chain).

Destination Zone: Recognizing that regions have unique characteristics, zones are specified by each LL. A paradigm was provided by NTUA. The variance in the size of these zones was deliberate. Adapting the zone sizes ensured that we capture the intricacies of local mobility patterns effectively.

Transport Mode, Trip Purpose, and Time Period: These critical variables help understand why, how, and when people move, painting a full picture of daily commutes and routines in each LL.

By setting the start time of each day at 05:00 in the morning, the form factors in trips made post-midnight, often as a result of recreational activities. This inclusion ensures we account for all movement patterns. To ensure precision, we opted for drop-down menus. The choice steers clear of the ambiguity that open-ended questions might introduce. This approach limits the number of possible responses, guaranteeing consistency in the information collected and making the data processing more streamlined.

This form didn't develop in isolation. It has its roots in previous research conducted by NTUA. The standardized format contributed to estimating Sustainable Mobility Indicators in cities with major mobility data limitations. The form also played a pivotal role in the development of the AthensPop package: https://github.com/Theodore-Chatziioannou/athenspop (Accessed: May 2025), a testament to its practical application (Andrinopoulou and Tzouras, 2025).

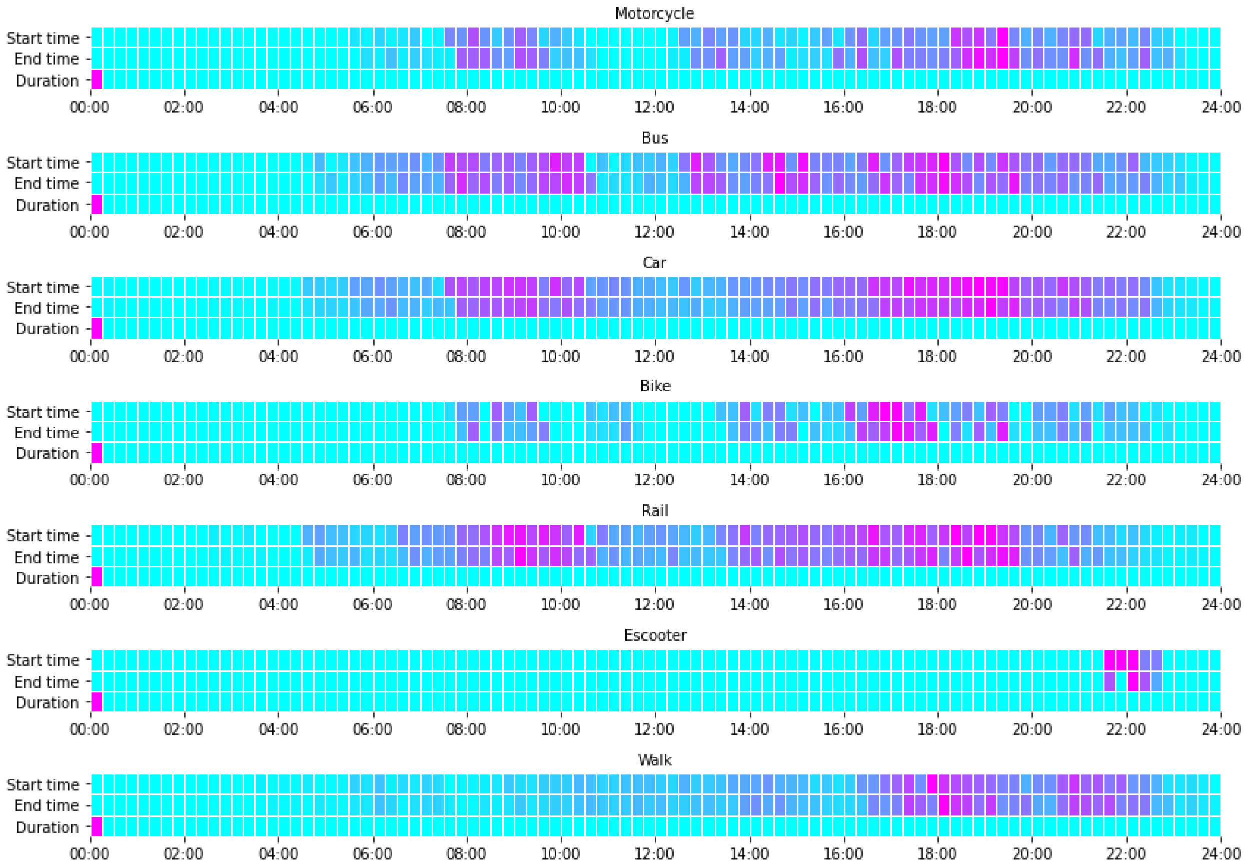

Figure 1. Transport mode vs time-of-the day.

4.2.2 Estimated variables and outputs

This is a list of the variables that were estimated based on the survey data collected from the form. These data were collected per LL ending up with a large dataset.

Section 1

- Walking distance decay effect,
- Cycling distance decay effect,
- Importance of each mode choice factor,
- Respondents' familiarity with technology: laptop, smartphone, application, etc.,
- Respondents' familiarity with shared mobility
- Usage of each shared mobility mode

Section 2

- Spatial distribution of trips (destination point),
- Modal split (in trips or veh*km),
- Trip purpose,
- Time distribution of trips,
- Number of trips per day.

Relationships among the previously mentioned factors will be searched to better understand mobility patterns in each city.

4.3 Data processing tools

Specialized data processing tools were developed in Python to organize and harmonize the different data sets, including functions that automatically download and organize the data. These tools have been utilized to also track the data collection process, evaluate the sample quality, and uncover preliminary statistical trends related to the mobility patterns. Three datasets were prepared per city. The first dataset contained participants' perceptions on travel behaviour. The preparation of this dataset involved four steps. First, the variables that will be downloaded from the raw data of each city were determined. In the third step, all unique responses per variable are found; these responses were written in six different languages (except English). Artificial intelligence techniques were employed to match each response with an English translation. The fourth step was to concentrate all datasets coming from the six different cities in one. A unique person ID was assigned, and the city from which each response originated is retained as an additional column. The second set referred to the travel diaries. The same steps as before were followed in the diaries' dataset (the second one), with the exception that each trip constitutes a single observation. Therefore, a single person ID could generate up to five observations. Last, using the person ID, the socio-demographic characteristics of each respondent were adjusted. This constitutes the third set of data.

The data processing, analysis and visualization were conducted using Python programming language importing the following packages: pandas (v1.4.4), matplotlib (v3.5.2), factor_analyzer (v0.5.1) and statsmodels (v0.3.12). A GitHub repository was created with the functions (tools) that process and organize the raw data: https://github.com/panosgjuras/SumSurveys (Accessed: May 2025). The developed algorithms respected the requirements posed by the developers of the Open-Data Platform. The processed datasets have been uploaded on Zenodo: https://doi.org/10.5281/zenodo.14887578 (Accessed: May 2025) and included in the Open-Data Platform: https://sum-odp.eu/items/28 (Accessed: May 2025).

4.4 Data analysis methodology

The analysis of the collected data was performed by (a) descriptive statistics, (b) data visualization and analysis of statistical trends and (c) statistical tests to identify potential associations between variables. The data visualization techniques mainly included heatmaps that indicate the relationships between two perceived variable or between one perceived variable and preferred modes (i.e., use or not in at least one trip). Additionally, the modal split was visualized based on typical pies. The Kendall rank correlation test was utilized to identify statistically significant correlations among the perceived variables considering all the observations, coming from all cities. This choice was made since the observations of most selected variables do not follow a normal distribution, as it was expected. The Kendall's correlation is a non-parametric statistical measure used to assess the strength and direction of association between two variables. Unlike Pearson correlation, Kendall's Tau does not assume normality of the data and is particularly suitable for ranked or ordinal data. The calculation involves comparing the number of concordant pairs (pairs of observations that have the same order in both variables) and discordant pairs (pairs of observations that have different orders in the two variables). The value of τ ranges from -1 to 1, where: $\tau = 1$ indicates a perfect positive correlation, $\tau = -1$ indicates a perfect negative correlation, $\tau = 0$ suggests no correlation. The Kolmogorov-Smirnov test was also utilized to reveal potential associations between perceptions and mode choices. To do so, the sample is divided into users and non-users of a specific mode. Based on this test, the distributions of each perceived variable are compared in order to highlight differences in the mean values which are statically significant for a given confidence interval. This decision was made to preserve the discrete format of mode choices, while investigation potential causal factors related to individuals' perceptions.

4.5 Survey distribution strategy

The survey is readily accessible via Google Form, ensuring a user-friendly experience for all participants. The timeline for its distribution was set to span across three months - starting from the Mobility Weeks in mid-September and running through October and half of November.

Before the survey reached a broader audience, a pilot study was conducted among our partners. This ensured the refinement of the process and gathering of preliminary insights. In tandem with the pilot, we are also developing advanced data visualization and analysis techniques. A notable feature is the automatic generation of results, which will provide quick and valuable insights from the collected data.

As for the locations, this survey is not limited to just one place. All LLs, both leading and follower labs, will be participating. It's imperative for each LL ecosystem to take charge of the distribution process and oversee the collection of completed survey forms. Overseeing the entirety of this process is NTUA, acting as the general coordinator to ensure a smooth and standardized procedure.

One of the primary goals of this survey is to achieve a representative sample that reflects various age groups, genders, and employment statuses. It is of importance that we maintain this balanced distribution, especially when we plan the subsequent survey distribution process after the transformative measures are implemented.

To increase the reach and flexibility of the survey distribution, multiple methods have been devised. The survey can be distributed online for those who prefer digital interactions. Additionally, for larger events, in-person survey distribution will be available using tablets. This ensures that we tap into a wide and diverse audience, enriching the depth and quality of our data.

4.6 GDPR

This survey aims to provide a safe and trustworthy environment for all participants. The following measures have been taken:

- **Anonymity**: The survey is entirely anonymous. We do not collect or store any identifiable information about the respondents.
- **Optional Personal Data**: While the survey might include questions related to personal demographics such as gender, age group, and income, participants have complete freedom regarding these queries. They can opt to skip such questions or simply choose the "prefer not to say" option.
- **Location Privacy in Diaries**: In the travel diaries section of the survey, we've taken extra precautions to safeguard respondents' privacy. We do not inquire about the exact location of any destinations. Instead, the LL ecosystems will delineate zones. To compute travel distances, we'll use the centroids of these zones.
- **Flexibility in Travel Diaries**: In the same section, while questions about the destination point, time of travel, and purpose of the trip are present, they aren't mandatory. The only essential piece of information we seek is the mode of travel used.
- **No Email Collection**: We respect the privacy of your digital identity. Therefore, we do not ask for or collect email addresses from any respondent.
- **Aggregate Presentation of Results**: Once the data has been collected and analysed, we will only present aggregated results. This means the individual travel diaries will remain confidential and will never be showcased in our presentations or reports.
- **Informed Consent**: Transparency is critical. As such, all participants are provided with a notice regarding informed consent at the beginning of the survey. This ensures that every respondent is aware of how their data will be used and can make an informed decision about their participation.

To ensure GDPR compliance, the following text has also been added in the survey form:

“Protecting your personal data is our top priority. To ensure this, we have ve put in place robust measures to safeguard the data you provide. Our data processing always complies with the obligations set by the legal framework, especially the General Data Protection Regulation (GDPR). By submitting the questionnaire, you consent to this data processing. Please note, the questionnaire is anonymous and completed on a voluntary basis. You are free to withdraw from the survey at any time.”

5 Revealed travel behaviour and citizens' perceptions

This section presents the analysis of the responses of the surveys conducted in all LLs. More specifically, we demonstrate in the following sections the data analysis regarding the i) Modal split, ii) Departure time, iii) Trip purpose, and iv) expected in-vehicle travel time to/from residents' daily activities.

As of M6 the following number of responses has been gathered from the LLs:

- Geneva LL: 461 responses (1022 reported trips)
- Krakow LL: 308 responses (349 reported trips)
- Rotterdam LL: 260 responses (434 reported trips)
- Jerusalem LL: 235 responses (230 reported trips)
- Coimbra LL: 211 responses (429 reported trips)
- Munich: 203 responses (376 reported trips)
- Fredrikstad LL: 201 responses (179 reported trips)
- Athens Penteli LL: 201 responses (362 reported trips)
- Larnaca LL: 201 responses (345 reported trips)

As the data collection and analysis will be conducted at least twice within this project - both before and after the implementation of SUM measures - this is an ongoing study serve as a vital tool for measuring the overall performance of the transport system of each LL.

5.1 Modal split

The first data analysis shows the so-called modal split. Modal Split refers to the share of trips per transport mode. Respondents revealed their behaviour through travel. Specifically, each respondent could describe up to 5 trips providing the destination, the mode, the time, and the purpose. The modes that were included in the drop-down menu as alternative options were: car, taxi, train, bus, motorcycle, bicycle, e-scooter, walking, car-sharing, micro-mobility, and ride-hailing or shuttle services. Modal split can also be given as a share per transport mode of vehicle kilometres and vehicle hours.

As of mid-November 2023, a total of 203 respondents in **Munich**, had provided their insights by completing the SUM survey. A relatively high diversity of transport modes was observed, with cars accounting only for 17.0% of trips. A significant portion of travel involves shared mobility modes such as car-sharing, ride-hailing, and micro-mobility, which together constitute 9.1% of trips. This is the highest percentage compared to other LLs. Taxis also play a major role, responsible for 14.4% of travel. Public transport, including trains, metro, and buses, has a substantial share of 38.6%. Active modes like walking, bicycles, and e-scooters make up less than 10% of the total. Figure 2 shows the modal split of Munich. It should be noted that the total number of trips that were described in this city was 376, which means approximately 1.85 trips per respondent.

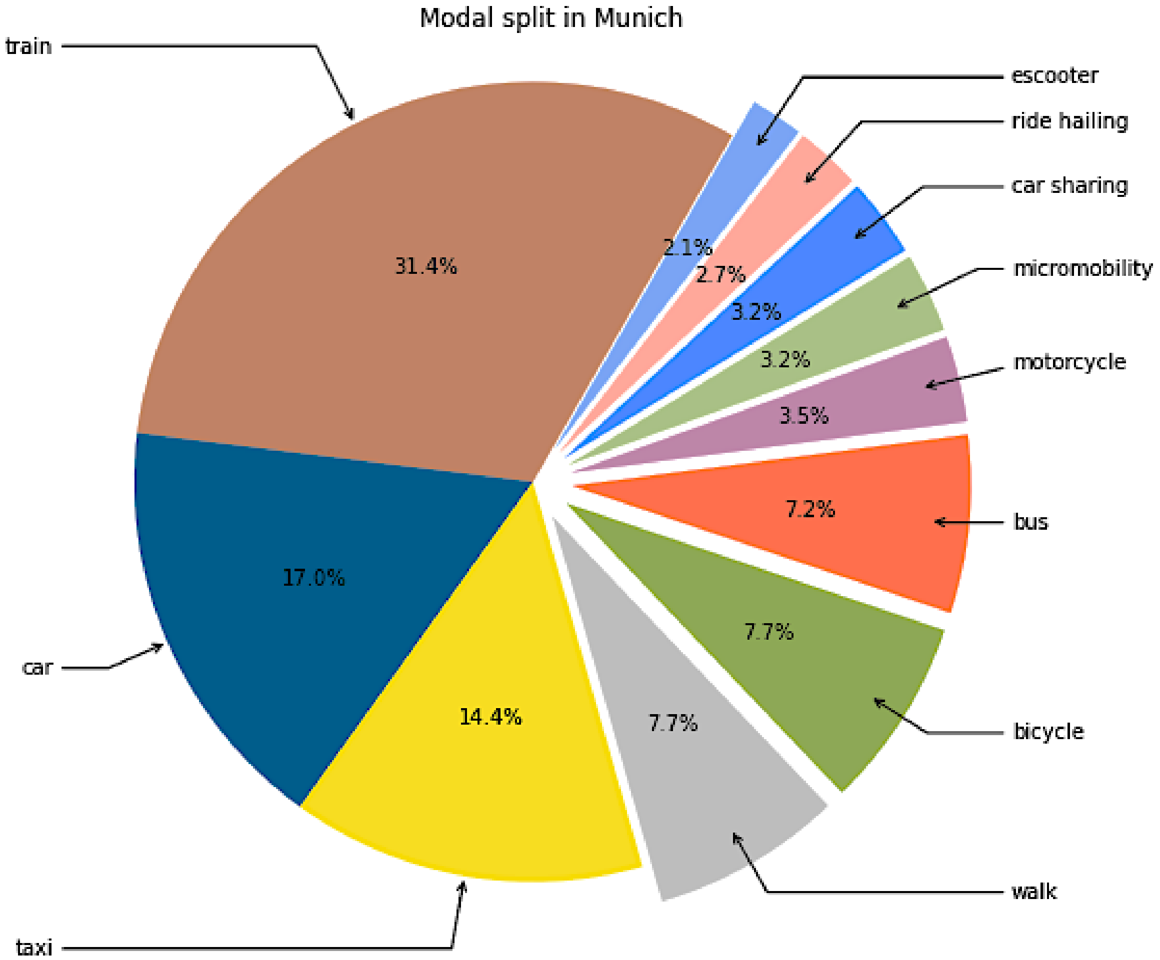

Figure 2. Modal Split of Munich

In **Jerusalem**, the modal split of trips reveals a relatively diverse transport pattern with car usage falling below 50%, unlike many other surveyed cities. Bus travel plays a significant role, accounting for 37% of total trips, making it the most widely used mode in the city. Train usage is also notable, comprising 15% of trips, indicating a strong reliance on public transport. Bicycle use, however, remains limited at below 5%. Usage of taxis, walking, motorcycles, and micromobility options such as ride-hailing and car-sharing in Jerusalem appears minimal or insignificant, as they were not specifically highlighted in the survey results for the city. Figure 3 shows the modal split of Munich. It should be noted that the total number of trips that were described in this city was 230, which means approximately 0.97 trips per respondent.

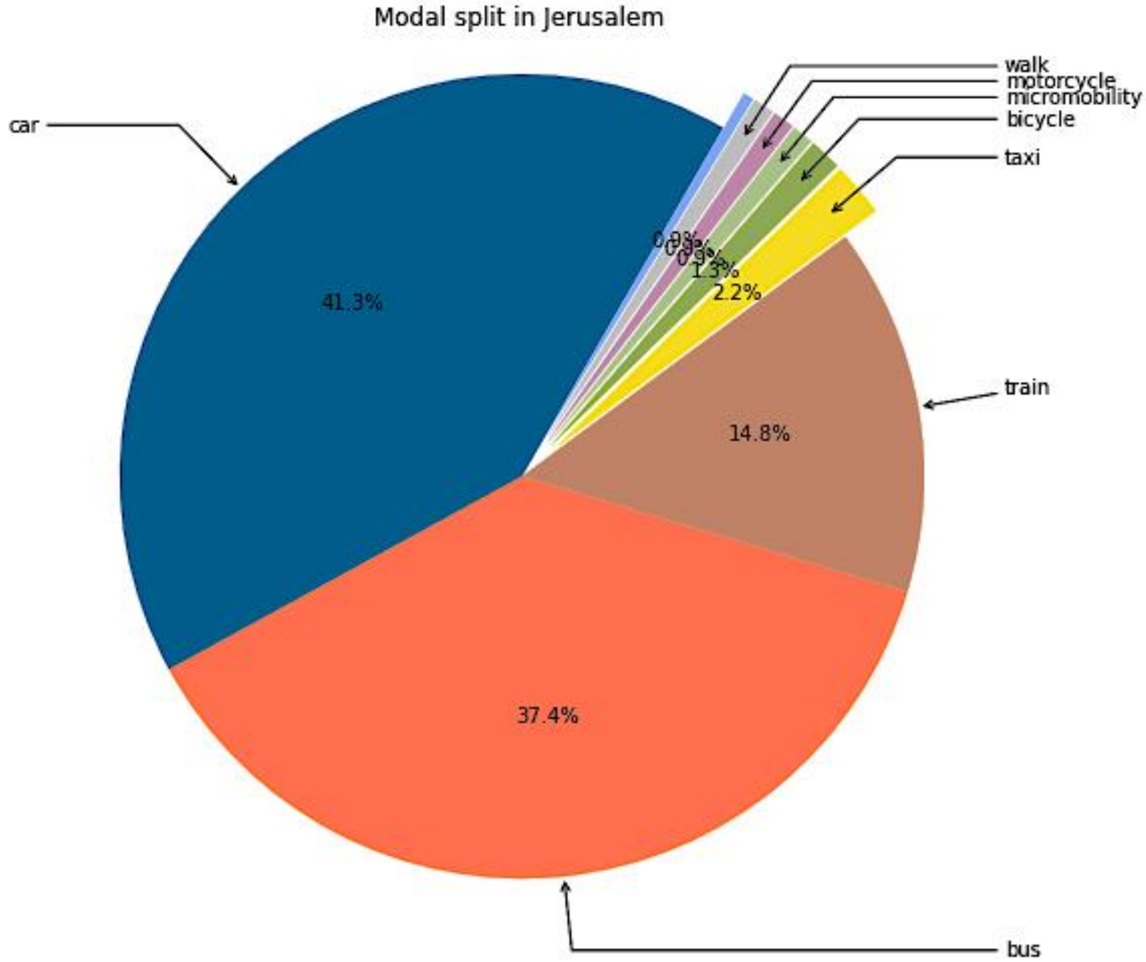

Figure 3. Modal Split of Jerusalem

Geneva presents a stark contrast, with only 8.6% of trips made by car, likely due to the survey targeting car-sharing users, who most likely don't own a car. In this LL, 461 respondents had filled out the survey until mid-November 2023. Overall, 1022 trips were recorded. Shared mobility modes such as car-sharing, ride-hailing, and micro-mobility have small but notable shares of around 3%. Public transport dominates in this set of travel diaries, with a 40.1% share. Bicycles are significantly popular, being the primary mode for 31.7% of trips, and walking is preferred by 15.2% of respondents. In Figure 4, the modal split of Geneva is shown (see chapter 2 for results on overall population from the mobility survey 2021). The transport modes in pies are standard in all the output pies. Note that in the Geneva LL, ride-hailing refers to ride-sharing, i.e., sharing a ride on someone's private car (ex: Blablacar). In the case of Geneva, there was a noticeable share of car-pooling (sharing a ride on someone's private car) trips. Car-pooling belongs to the wide spectrum of shared mobility. To follow the same format, these trips were grouped as ride-hailing trips. This choice is reasonable since these trips are booked using a very similar (to ride hailing) application.

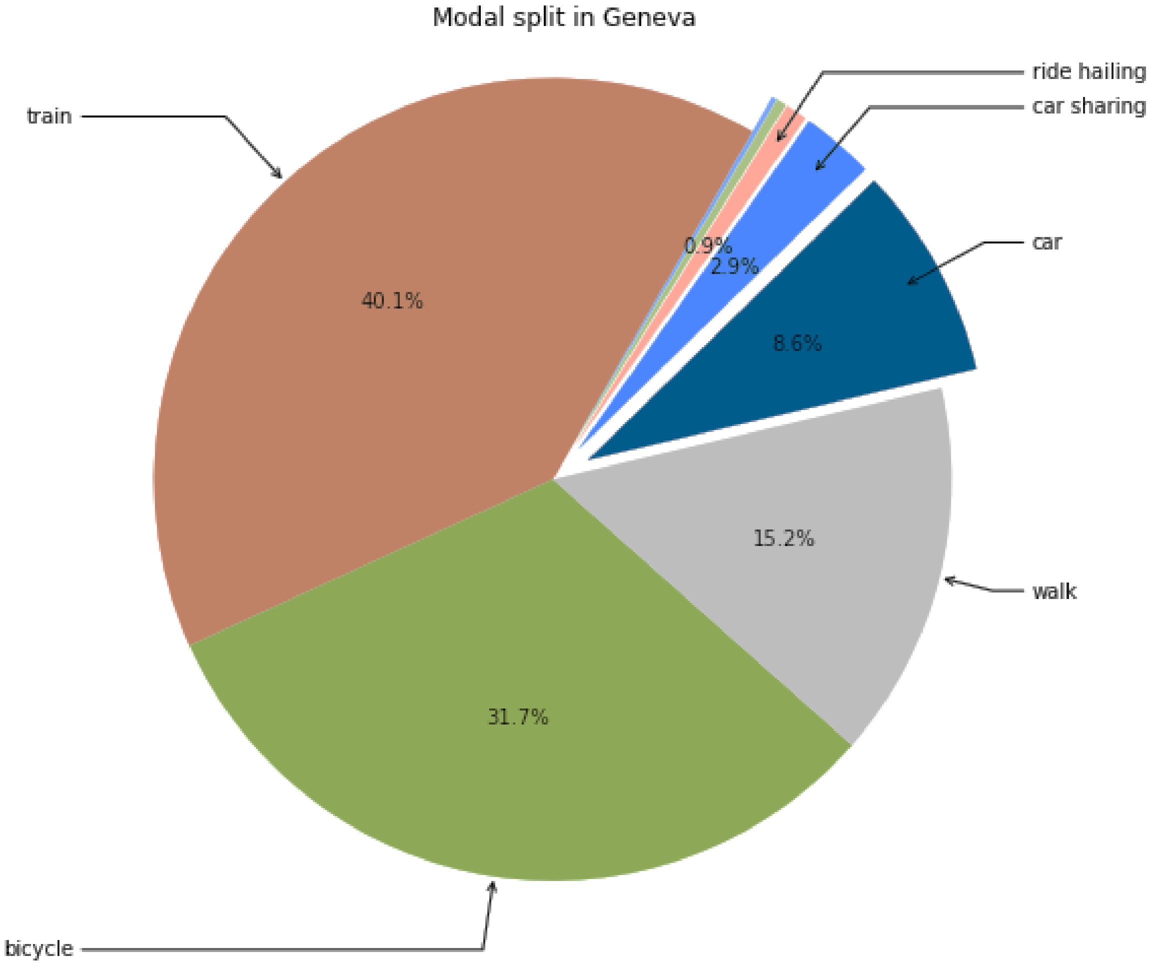

Figure 4. Modal Split of Geneva

In **Athens, Penteli**, 201 participants showed a strong preference for private cars, with 54.7% of the described trips made by this mode. The total number of trips included in this set was 362. Shared mobility, including car-sharing and ride-hailing, is almost negligible in Athens. Yet, conventional taxis account for 7.7% of trips, and public transport (trains, metro, and buses) makes up 22.9%. Walking is the main mode for 9.1% of short-distance trips, and motorcycles are used for 4.7%, while bicycle usage is very low. Figure 5 presents the transport mode distribution of Athens Penteli.

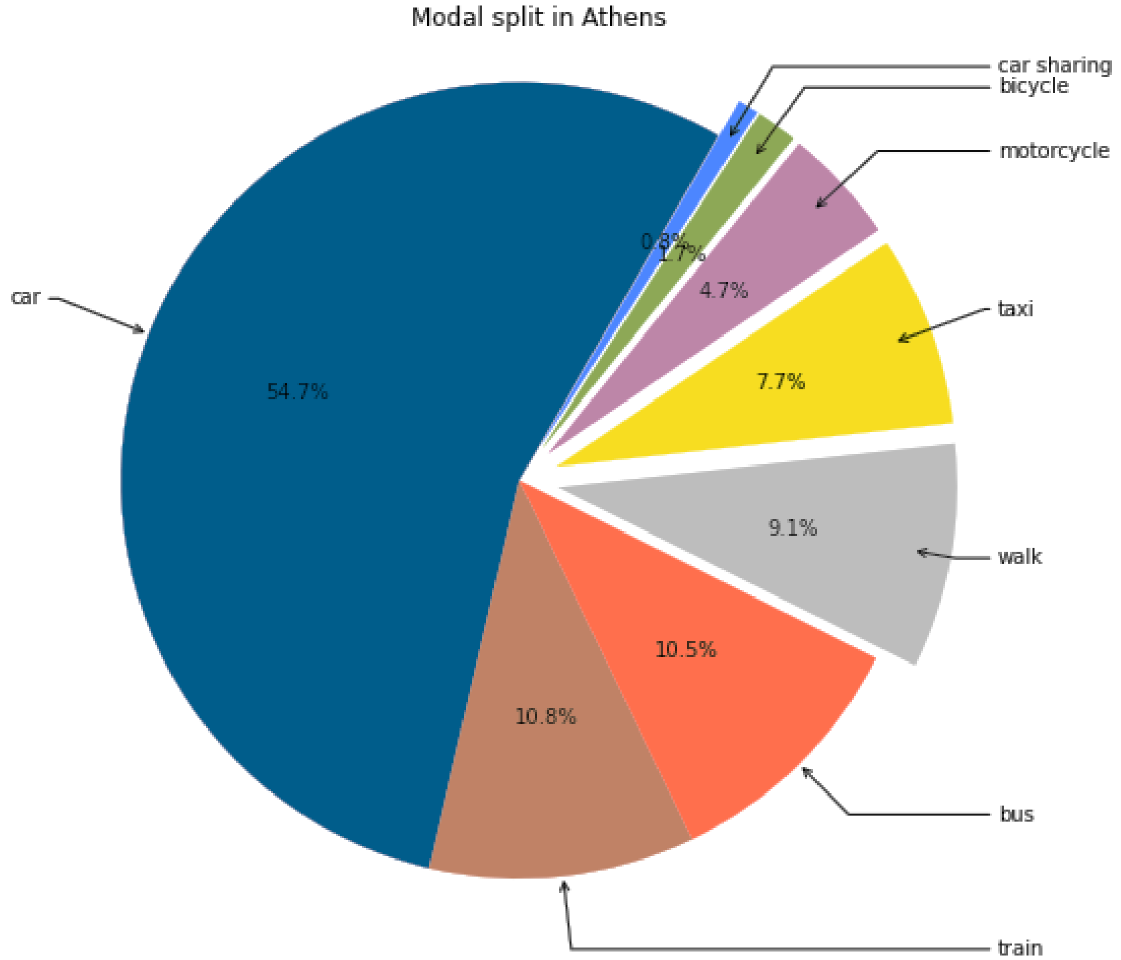

Figure 5. Modal split in Athens Penteli

Rotterdam transport scene is also diverse, with 48.4% of trips made by car. In this city, 300 respondents filled out the survey form; yet the diaries set includes only 434 trips. This means that some respondents choose to not give their present mobility patterns. Shared mobility modes have a combined share of approximately 5%, and conventional taxis are used for only 1.6% of trips. Public transport (trains, metro, and buses) accounts for 15.9%, and walking is the main mode for about 7% of trips. Notably, bicycle usage is the highest in this city, at around 21.9%. Figure 6 shows the modal split of Rotterdam.

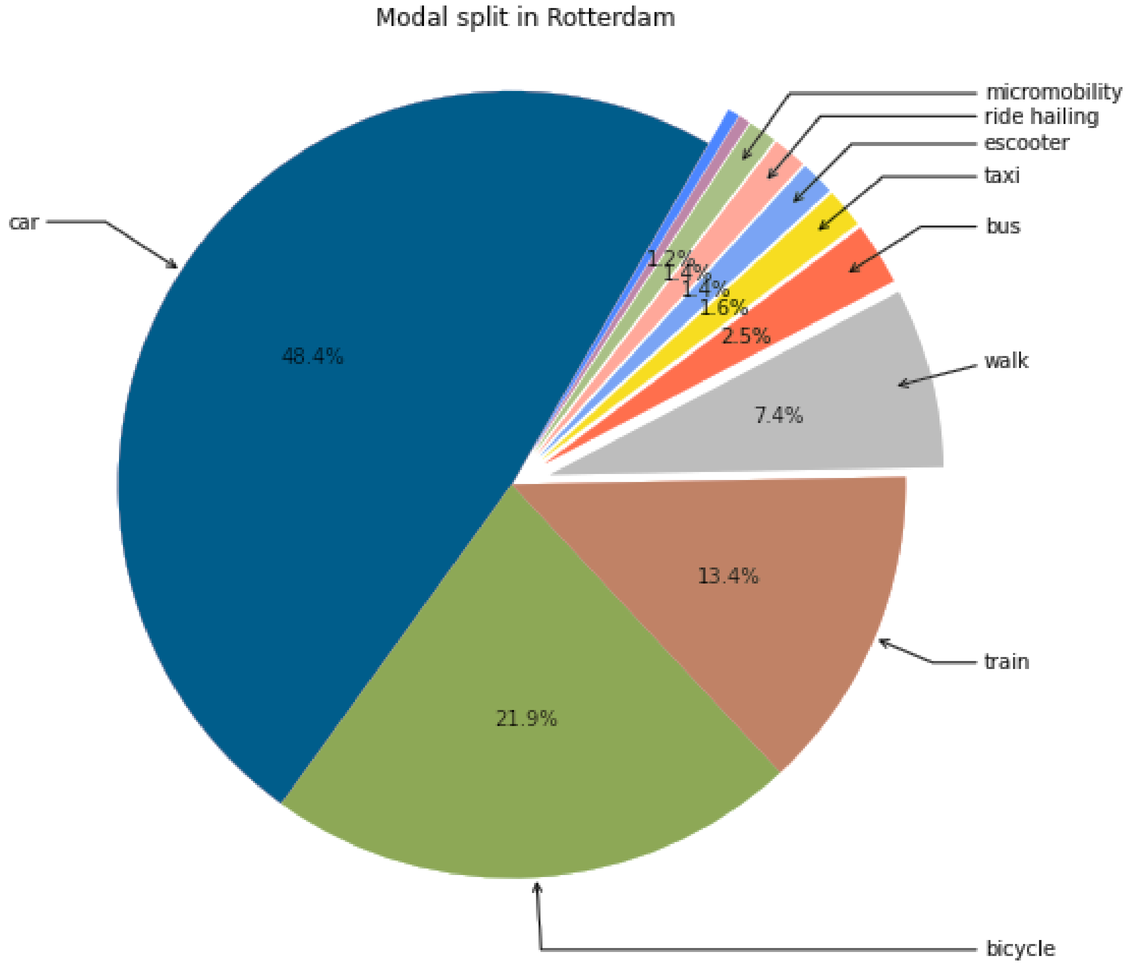

Figure 6. Modal Split of Rotterdam

In **Krakow**, cars are the dominant mode of transport, used for 50.7% of trips. Shared mobility modes have a minimal presence, with shares below 1%. Public transport, including trains to outside areas and buses within the city, accounts for 39.3% of total. Walking is chosen for 3.4% of trips, while bicycles and e-scooters have shares of 4% and 1.1%, respectively. The total number of trips included in the dataset was 349. In total, 306 respondents participated in the survey. Figure 7 shows the modal split of Krakow.

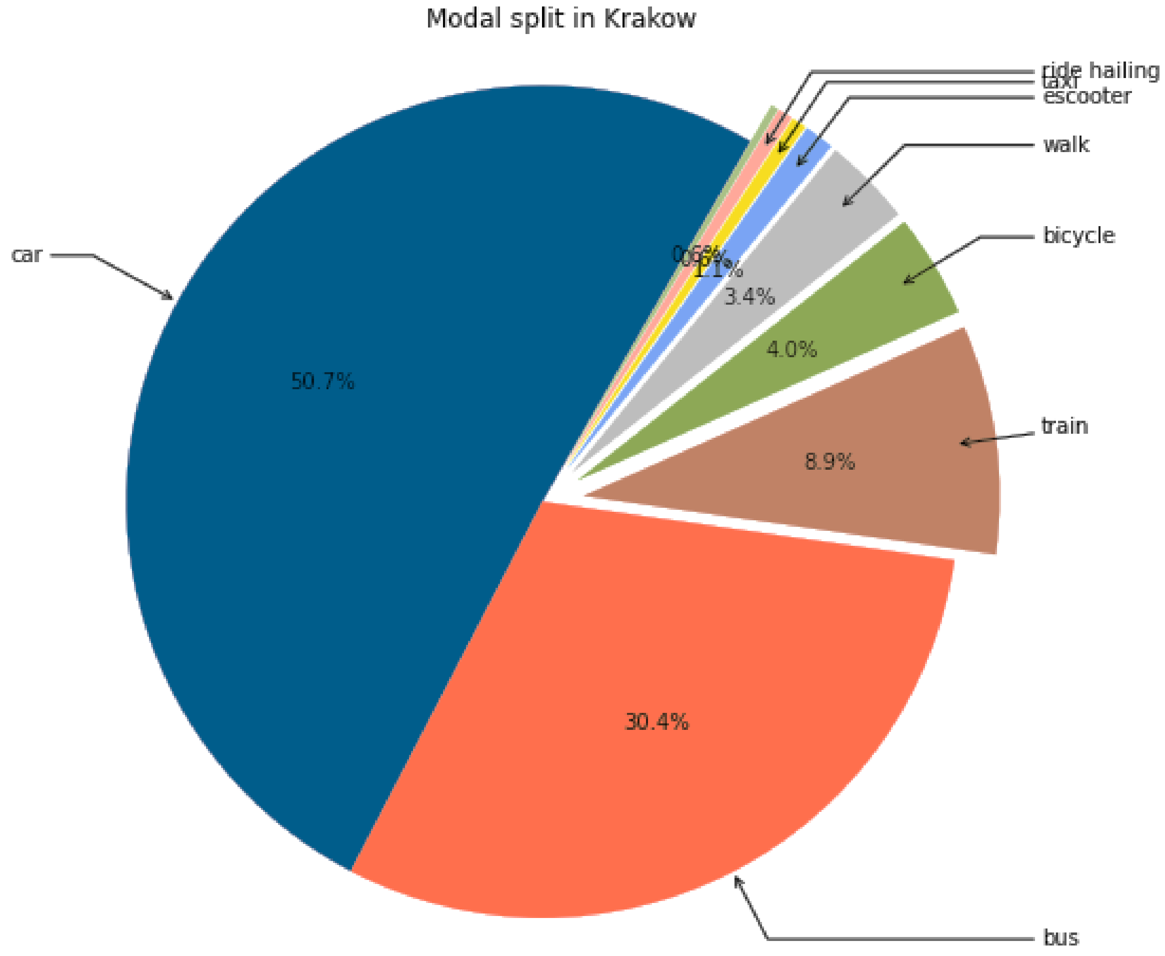

Figure 7. Modal Split of Krakow

In **Fredrikstad**, the use of cars is particularly high at 62.0%. Unique to this city is the use of ferries, accounting for 7.3% of travel. Shared mobility modes are not widely integrated, except for car-sharing, which has a 2.6% share. Bicycles are used for 8.4% of trips, and buses account for 9.0%. The total number of trips included in this dataset was 179. In Figure 8, the modal split of Fredrikstad is shown.

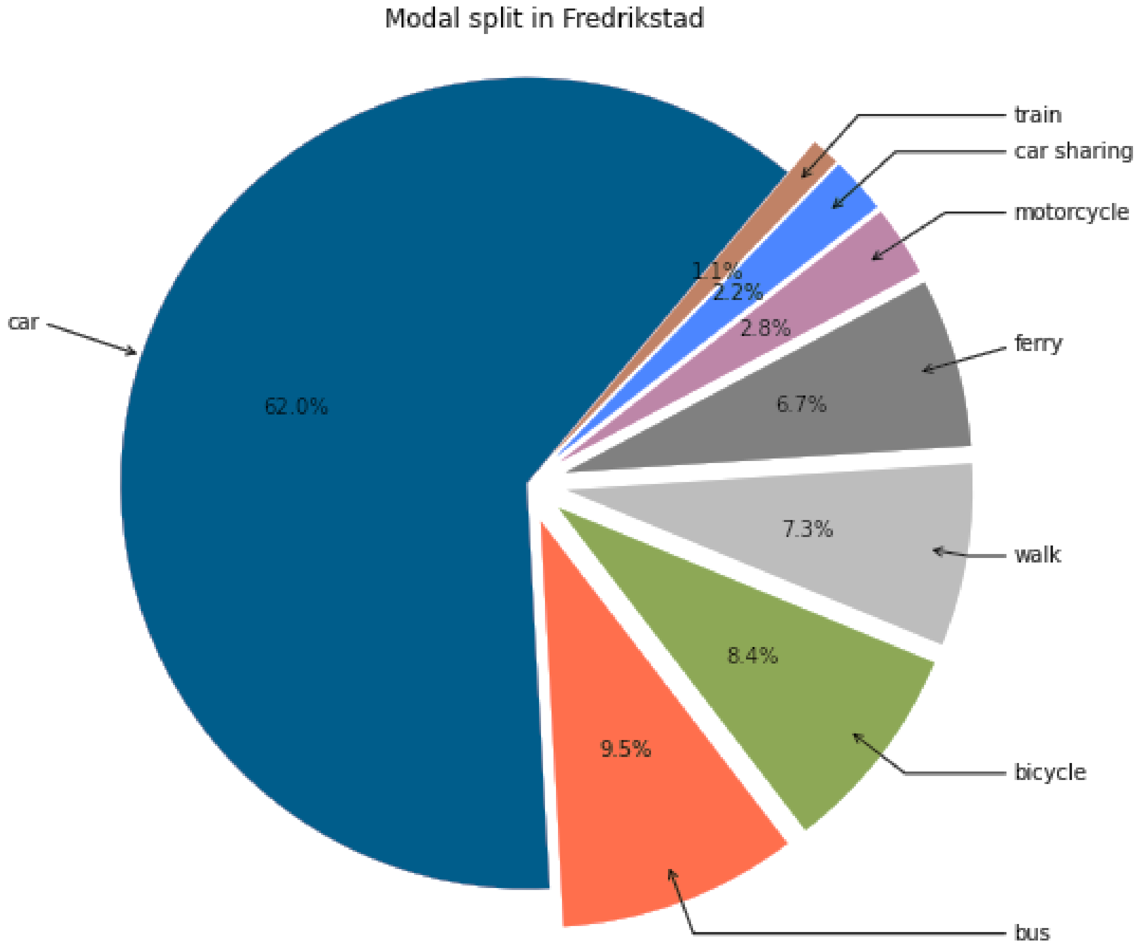

Figure 8. Modal Split of Fredrikstad

In **Larnaca**, cars are more than the dominant mode of transport, used for 85.5% of trips. Shared mobility modes have a minimal presence, with shares below 0.5%. Public transport, including only buses within the city, accounts for 8.4% of 345 trips. Walking is chosen for 2.9% of trips. In total 202 respondents participated in the survey. Figure 9 shows the modal split of Larnaca.

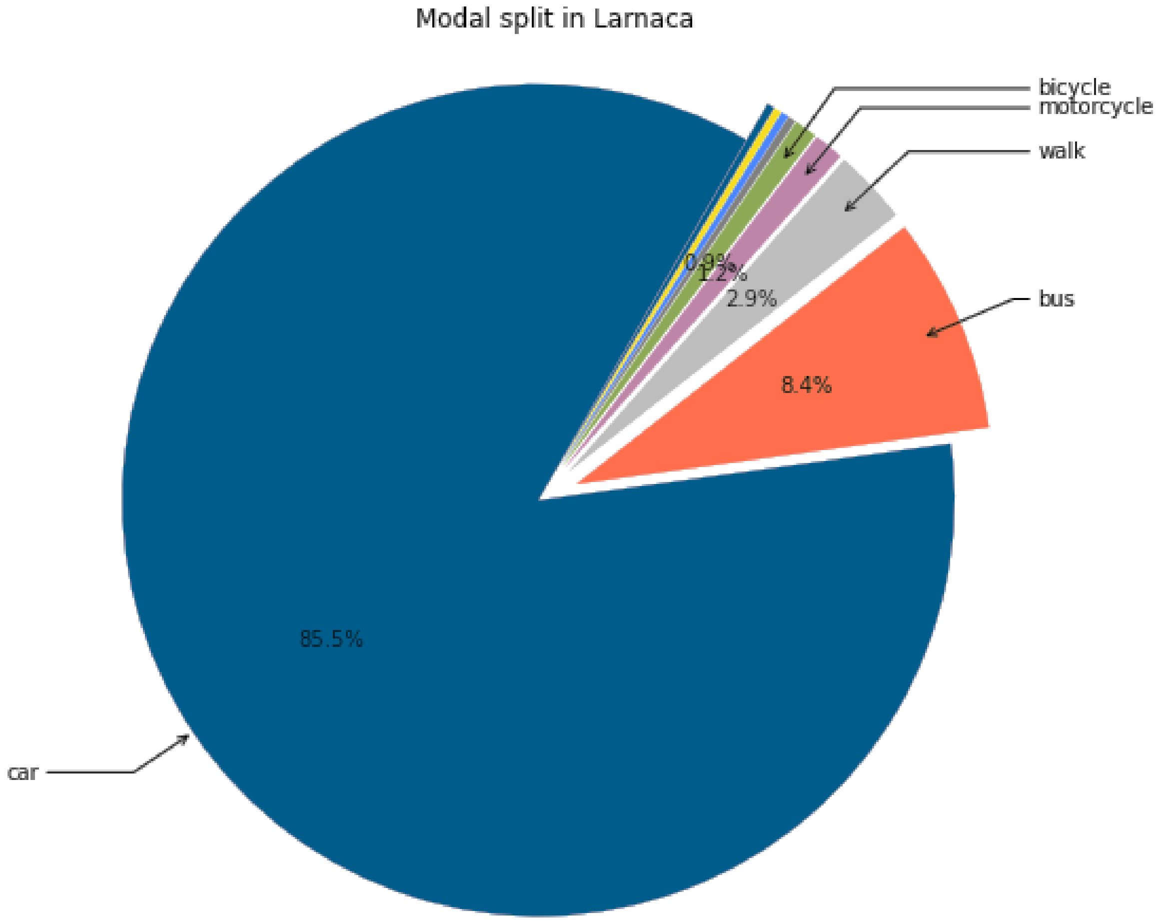

Figure 9. Modal Split of Larnaca

In **Coimbra,** 211 participants showed a strong preference for private cars, with 61.1% of the described trips made by this mode. The total number of trips included in this set was 429. Trips with shared mobility modes including car-sharing and ride-hailing was almost absent in this set of diaries. Yet, public transport (buses) makes up 31.5%. Walking is the main mode for 2.6% of short-distance trips, and bicycles are used for 3.3% of trips. Figure 11 presents the transport mode distribution of Coimbra.

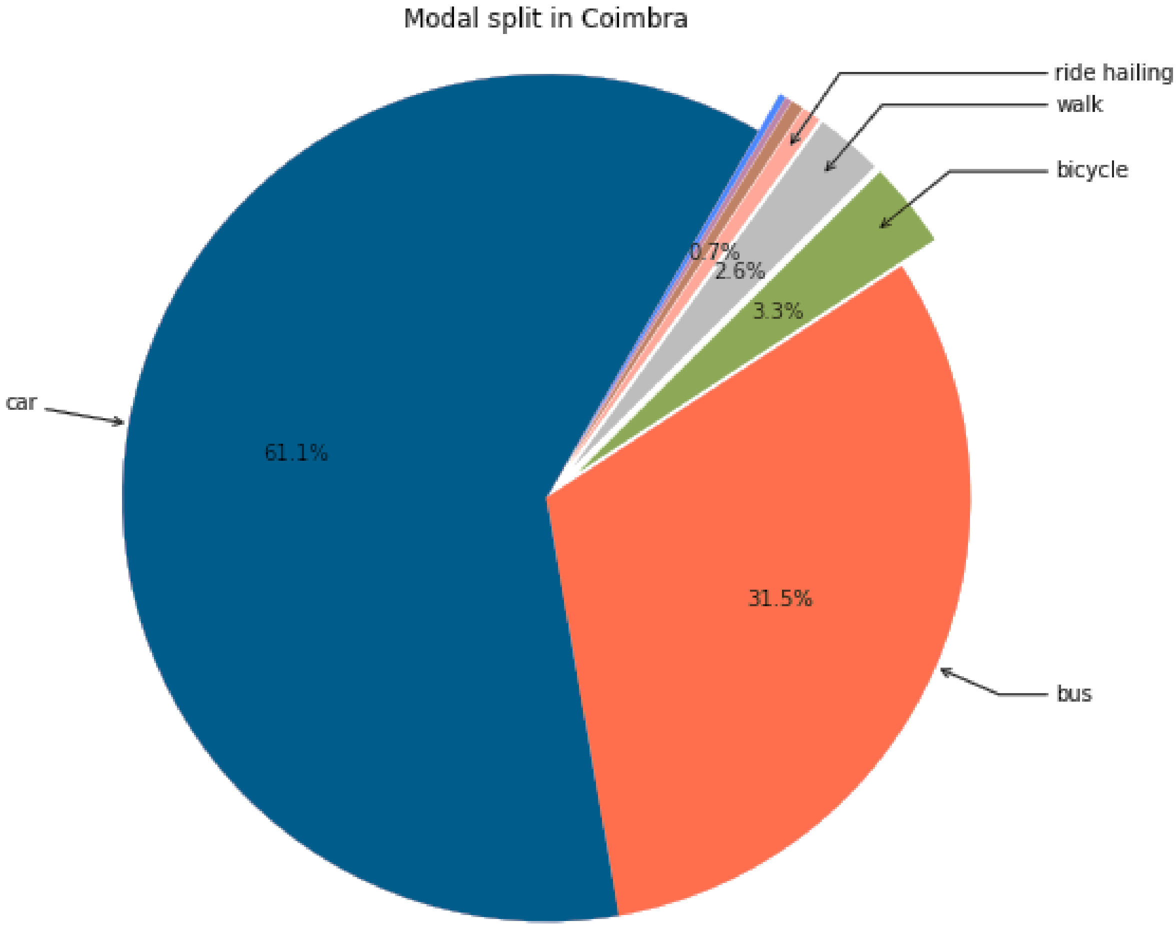

Figure 10. Modal Split of Coimbra

5.2 Departure time

The forthcoming analysis unfolds through a series of Figures that intricately map out the temporal distribution of trips across various transport modes, delineated for each LL. These graphical representations serve a dual purpose: firstly, they lay bare the predominant transport modes that anchor the mobility framework of each LL, and secondly, they highlight the temporal windows when these modes are most and least utilized.

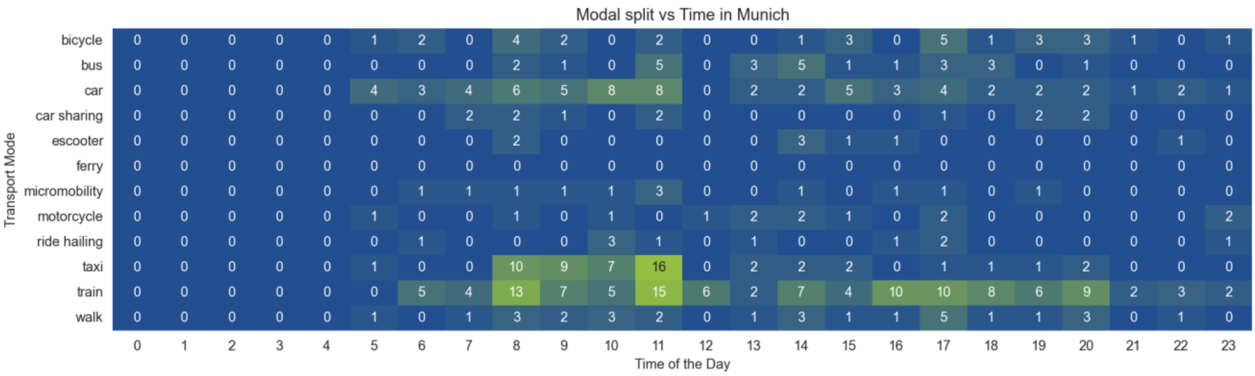

Figure 11. Trip start time distribution per transport mode in Munich

The mobility patterns of **Munich** show a distinct morning peak starting at 8:00 to 11:00, with the afternoon peak spreading between 15:00 and 17:00. During these times, taxis, metro or train, and cars are the most frequently used modes of transport. Notably, metro usage spikes at 20:00, and bicycles become a popular alternative in these evening hours. Figure 11 shows the relationship between start trip times and transport modes in Munich.

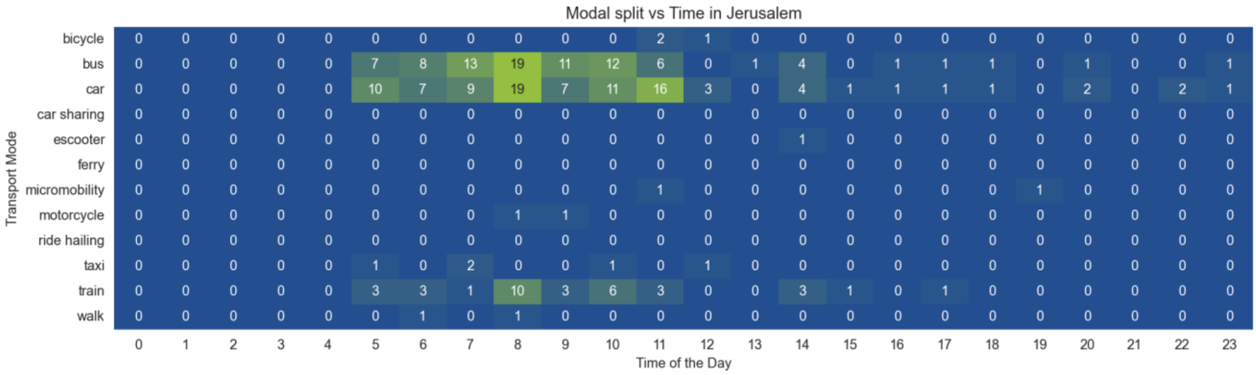

Figure 12. Trip start time distribution per transport mode in Jerusalem

In Jerusalem, the morning peak appears at 8:00 in the morning, where the highest share of both bus and car trips starts. Similar temporal patterns appear in train services. Figure 12 show the temporal distribution of reported trips per transport mode in this city.

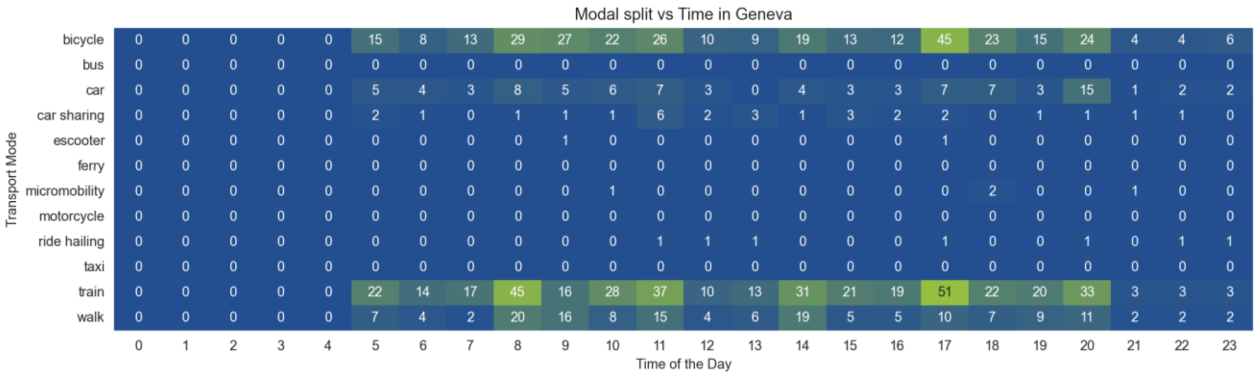

Figure 13. Trip start time distribution per transport mode in Geneva.

In **Geneva**, the morning peak hour is sharply defined at 8:00, but a high proportion of trips also start at 11:00, mainly using public transport. Bicycle usage follows a similar time distribution, while walking trips increase during non-peak hours, reflecting a more spread-out pattern of mobility throughout the day. Figure 13 shows the relationship between start trip times and transport modes in Geneva.

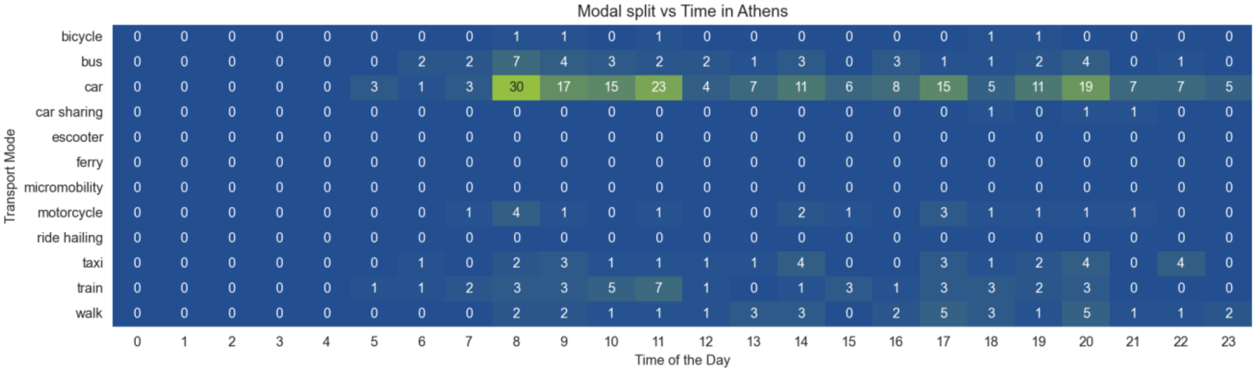

Figure 14. Trip start time distribution per transport mode in Athens Penteli

Athens Penteli exhibits a different mobility pattern, heavily reliant on cars with high peaks observed from 9 to 11 in the morning and again from 17:00 to 19:00 in the evening. Car usage remains high even at 20:00, indicating a consistent preference for this mode of transport throughout the day. Public transport, especially the metro, emerges as a significant alternative, particularly during the morning and midday hours. Figure 14shows the start time distribution of 362 trips reported in Athens Penteli.

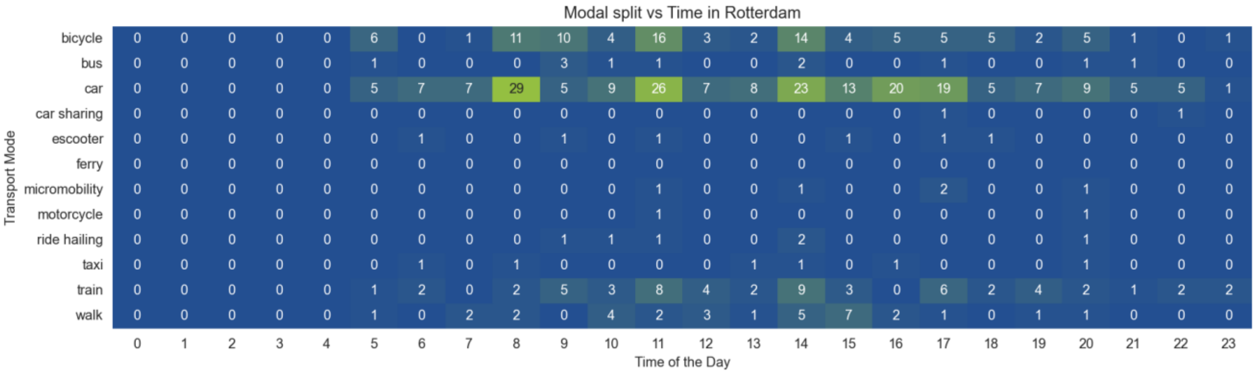

Figure 15. Trip start time distribution per transport mode in Rotterdam.

Rotterdam peak hours mirror those of many cities, with morning traffic peaking at 8:00 and the afternoon peak from 14:00 to 17:00. Bicycle trips in Rotterdam align closely with the patterns of car and train usage, indicating a competitive situation between these three modes of transport. Figure 15 presents this temporal distribution.

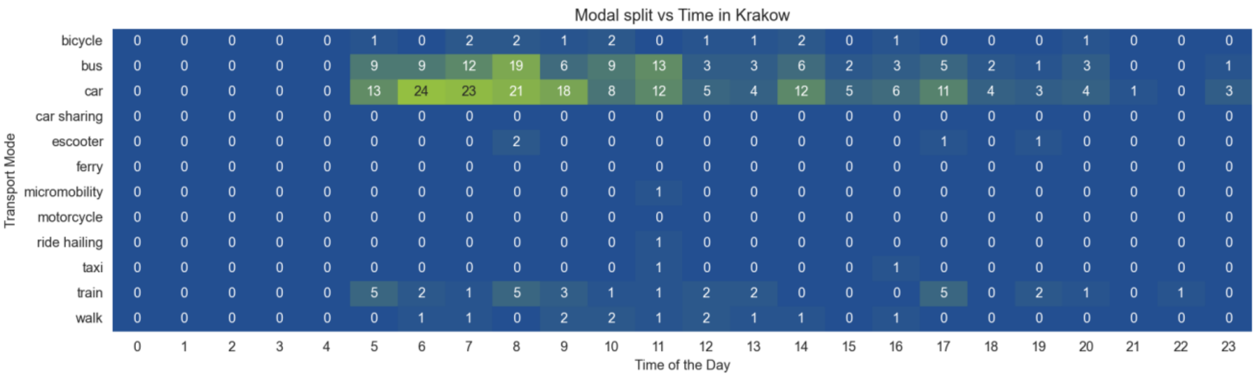

Figure 16. Trip start time distribution per transport mode in Krakow

Based on the survey data, **Krakow** travel behavior is characterized by an early start, with a significant number of trips reported between 5:00 and 9:00 in the morning, followed by a lower number in the afternoon peak. The city shows a particular trend where respondents often describe just one trip, leading to these distinctive patterns. Buses and cars are the dominant modes of transport for daily activities. Figure 16 shows the start time distribution of 349 trips reported in Krakow.

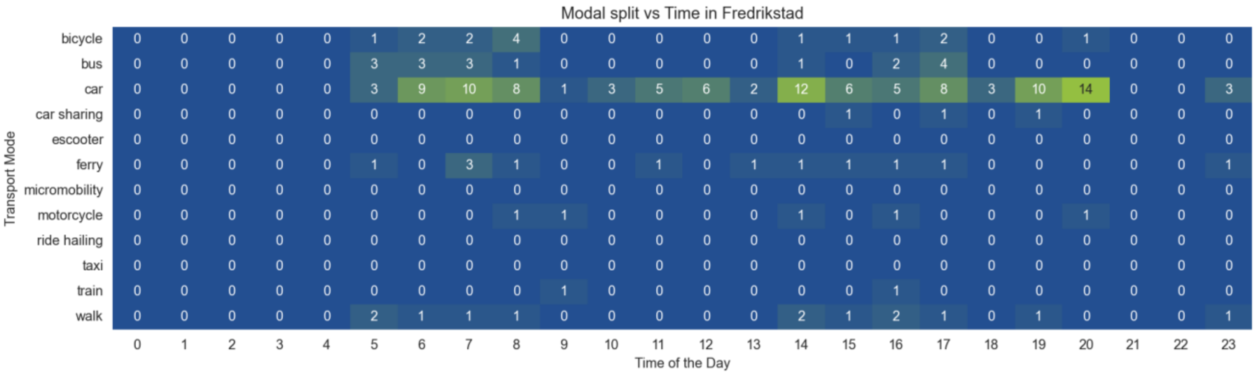

Figure 17. Trip start time distribution per transport mode in Fredrikstad

In **Fredrikstad**, mobility begins notably early, with significant activity starting at 5:00 in the morning. Cars dominate the peak hours, particularly at 14:00 and 20:00, showcasing a higher late-day activity compared to other cities. This early start and extended evening usage reflect Fredrikstad unique transport trends. Figure 17 shows the relationship between start trip times and transport modes in Fredrikstad.

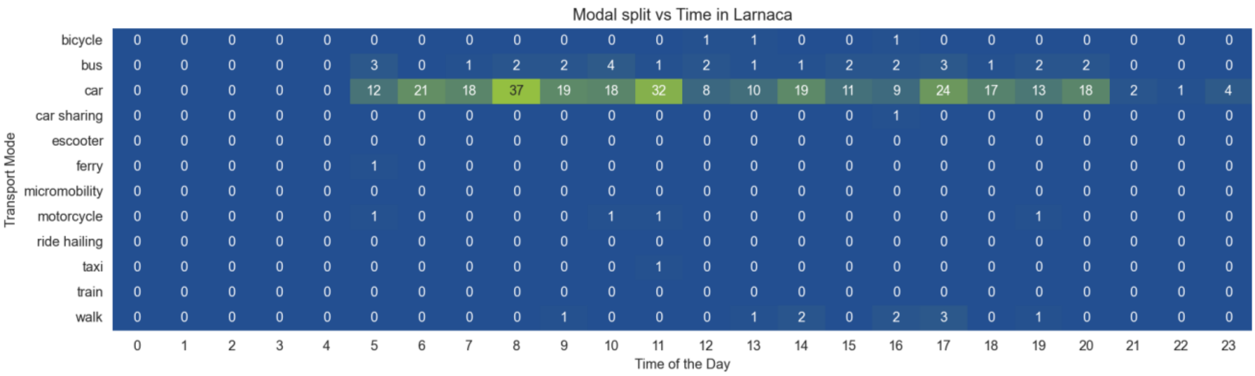

Figure 18. Trip start time distribution per transport mode in Larnaca

Larnaca peak hours mirror those of many cities, with morning traffic peaking at 8:00 and the afternoon peak at 17:00. Cars seem to be the only solution. Figure 18 presents this temporal distribution.

Figure 19. Trip start time distribution per transport mode in Coimbra

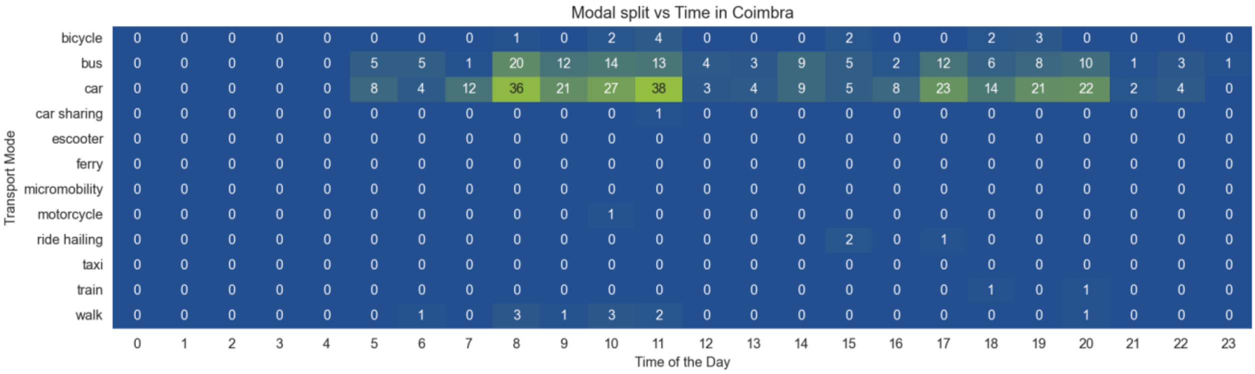

Figure 19. Trip start time distribution per transport mode in Coimbra

Coimbra peak hours follow the same patterns of those of many cities, with morning traffic peaking at 8:00 and the afternoon peak at around 17:00 to 18:00. Public transport trips in Coimbra have the same time distribution of car usage, indicating a competitive situation between these two only transport modes in this city. Figure 19 presents this temporal distribution.

5.3 Trip purpose

This data analysis considers a third perspective by categorizing trip data based on the purpose behind each journey, with a focus again on the transport modes. The key purposes identified, include commuting to work, returning home, attending educational institutions, shopping, recreation, health-related visits, accessing other services, and other activities.

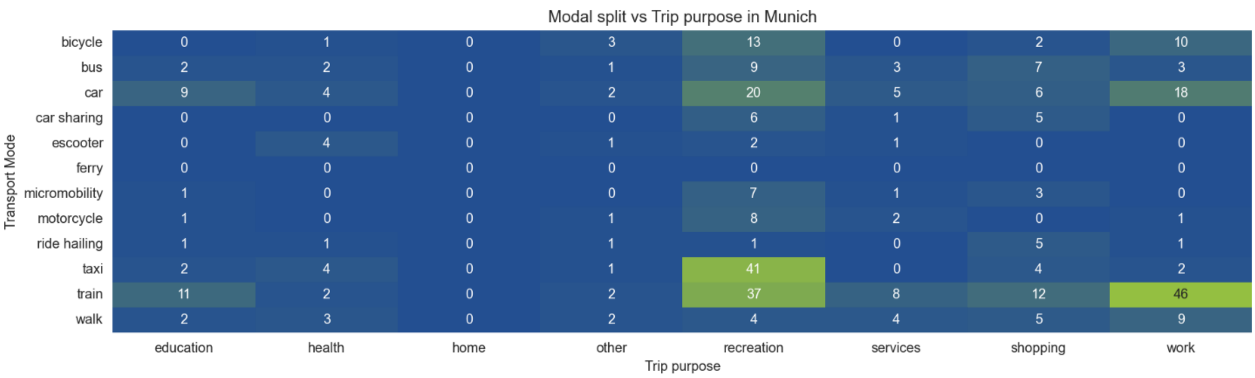

Figure 20. Trip purpose vs transport mode in Munich

In **Munich**, the dataset predominantly contains recreation trips using a variety of transport modes, with cars, trains, or metro, and taxis being the most popular choices. Interestingly, 90 (23.93%) work-related trips were reported. Trains are frequently used for shopping, work, and educational activities, whereas taxis do not share the same popularity in these categories as they do for recreational purposes. The previously mentioned insights are presented in the matrix of Figure 20.

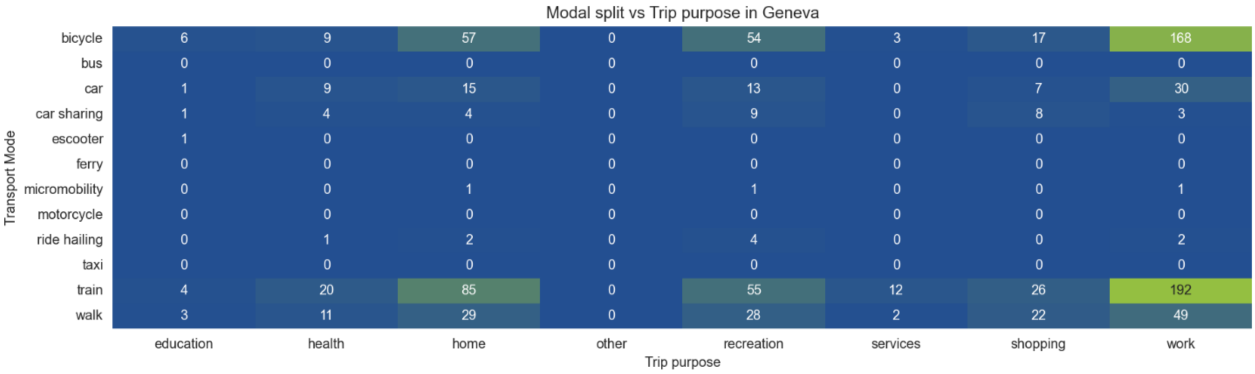

Figure 21. Trip purpose vs transport mode in Geneva

Geneva survey data primarily reflects 445 trips from home to work, with bicycles and walking being the primary modes of transport, indicating a uniform trend. These modes, seen as alternatives to cars, are used for multiple purposes, which is significant considering the respondents are primarily public transport commuters. The previously mentioned insights are presented in the matrix of Figure 21.

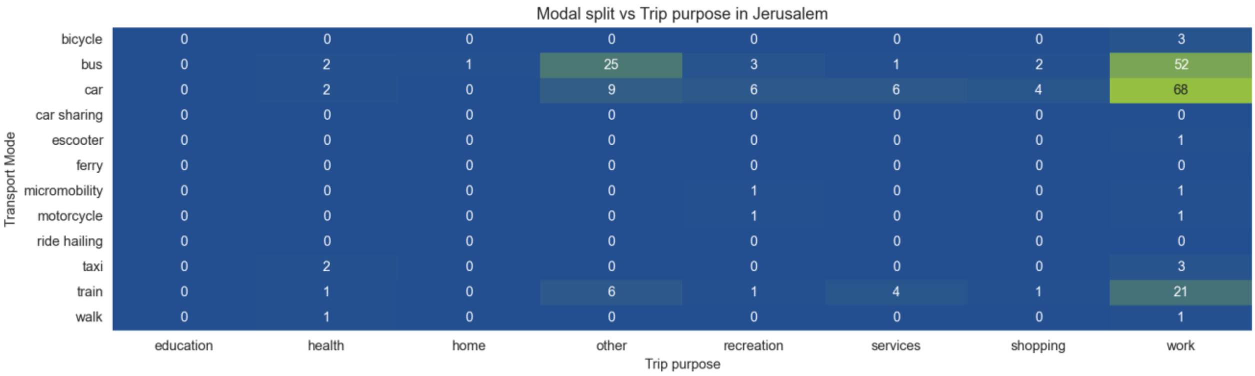

Figure 22. Trip purpose vs transport mode in Jerusalem

In **Jerusalem**, car and bus are the main transport mode used for commuting to work. Yet, in other activities, bus receives a relatively higher share (25 out of 40 reported trips) compared to private car. These trends are presented in Figure 22.

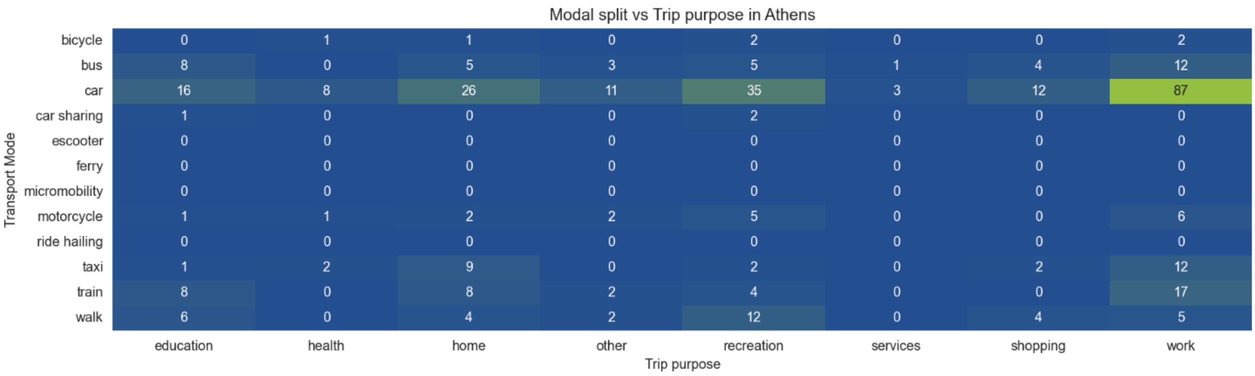

Figure 23. Trip purpose vs transport mode in Athens Penteli

Athens Penteli shows a different and more expected pattern with 87 work-related trips predominantly made using private cars. Cars are also a popular choice for recreational activities, accounting for 35 trips. This indicates that people use their cars for both commuting to work and leisure activities. Public transport and taxis have emerged as the main alternatives for work commutes. Interestingly, walking is a popular mode for both recreation and educational activities within the municipality of Penteli. The heatmap of Figure 23 gives the relationship between transport mode and trip purpose in Athens.

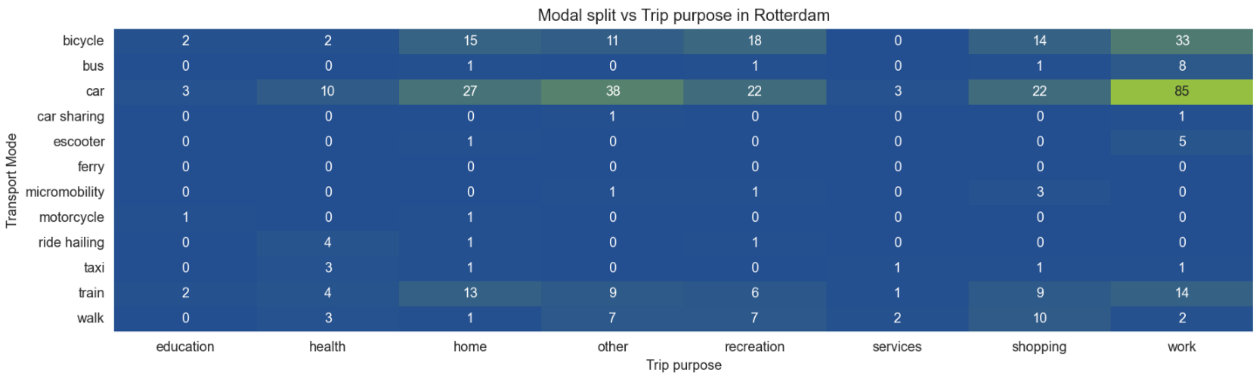

Figure 24. Trip purpose vs transport mode in Rotterdam

In **Rotterdam**, bicycles are commonly used for commuting to work and for recreational or shopping activities. The use of private bicycles for returning home completes the trip chain. The metro is primarily used for work commutes, while cars, due to their flexibility, are used for various activities including work, shopping, and others. Interestingly, Rotterdam reported the highest number of trips (26 trips) made for health-related reasons. The heatmap of Figure 24 gives the relationship between transport mode and trip purpose in Rotterdam.

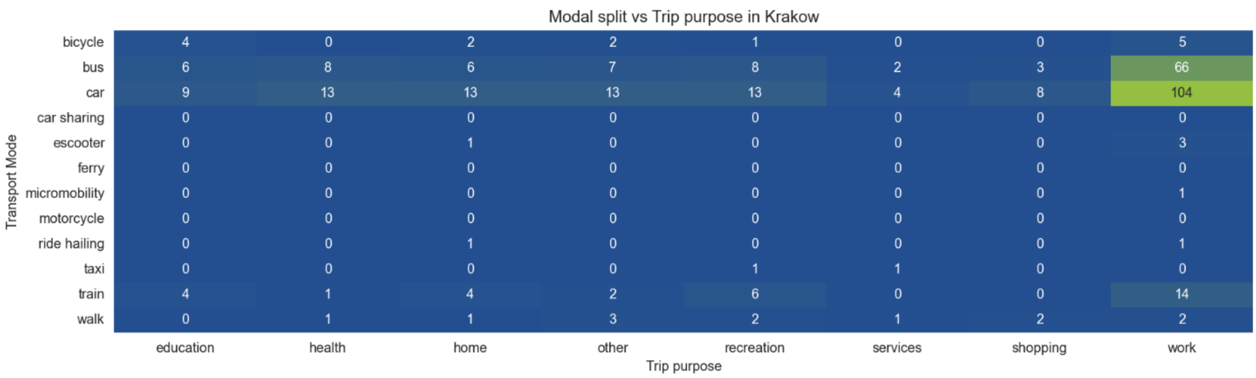

Figure 25. Trip purpose vs transport mode in Krakow

Krakow reported mobility patterns are dominated by work commutes, primarily using buses and cars. The lower share of afternoon trips results in fewer trips being recorded for activities other than work, such as recreation, making it challenging to draw concrete conclusions considering this perspective. The previously mentioned insights are presented in the matrix of Figure 25.

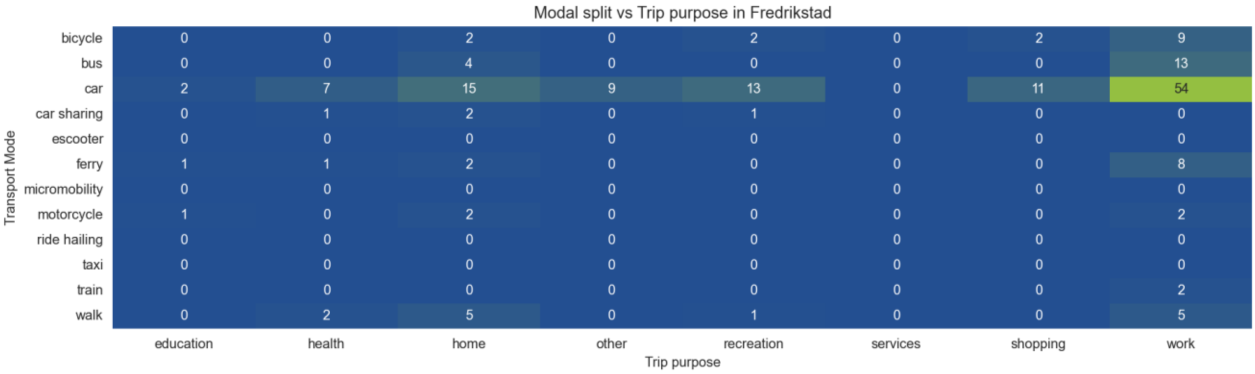

Figure 26. Trip purpose vs transport mode in Fredrikstad

Fredrikstad exhibits similar work commute patterns, with cars, buses, bicycles, and uniquely, ferries, being the main modes of transport. The use of ferries for commuting to work highlights the distinct nature of Fredrikstad transport landscape, differentiating it from the other cities. The heatmap of Figure 26 gives the relationship between transport mode and trip purpose in Fredrikstad.

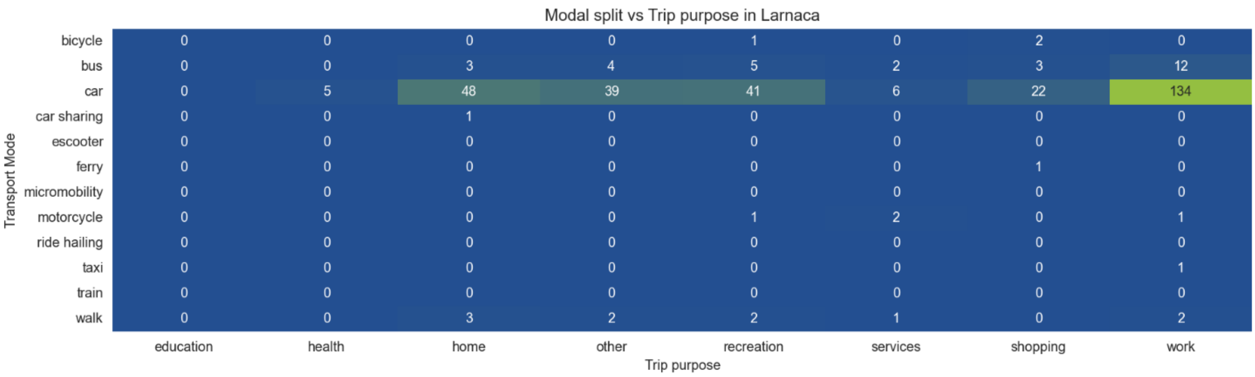

Figure 27. Trip purpose vs transport mode in Larnaca

Larnaca reported mobility patterns are dominated by work commutes, primarily using cars (284 trips). The lower share of afternoon trips results in fewer trips being recorded for activities other than work. The previously mentioned insights are presented in the matrix of Figure 27.

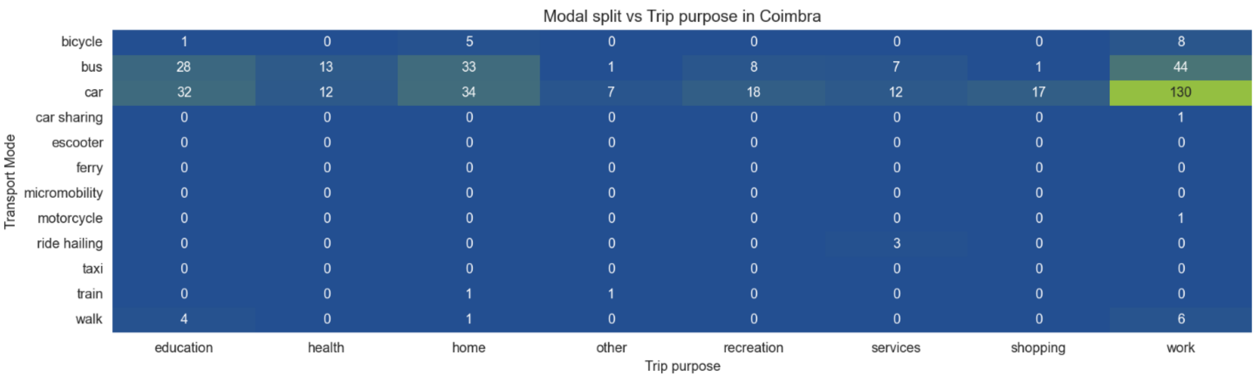

Figure 28. Trip purpose vs transport mode in Coimbra

Coimbra survey data primarily reflects 190 trips from home to work, with car and bus being the primary modes of transport. Moreover, these transport modes are highly used by the respondents both for education and recreation activities. The previously mentioned insights are presented in the matrix of Figure 28.

5.4 Transport system evaluation

The assessment of urban transport systems within this study is based on respondents' perceptions, which shape their travel behavior and, ultimately, their satisfaction with mobility services. Respondents provided their evaluations for various transport modes, including those they do not use. There was a separate section in the survey form to perform this data collection process. This subjective evaluation extends across 11 key indicators: in-vehicle travel time, walking and waiting times at transit stops, affordability, multimodality, reliability, inclusivity, personal and perceived safety per transport mode, policy acceptance, and user satisfaction. The rich dataset provided by this approach in descriptive statistics and correlation tables for each LL detailing the nuanced interplay between various elements of the transport system and their impact on user experience. As the data collection and analysis will be conducted at least twice within this project - both before and after the implementation of SUM measures - this ongoing study serves as a vital tool for measuring the overall performance of the transport system of each LL. It not only reflects immediate user perceptions but also sets the stage for measuring the longitudinal effects of transport policies.

This section particularly focuses on the expected in-vehicle travel time to/from their daily activities, e.g., work, education, etc. The relationship of in-vehicle travel between peak hours and non-peak hours is visualized and particularly investigated. This indicates the performance of the transport system, at least as it is perceived by the citizens of each LL.

Starting with **Munich**, the data reveals an optimistic view of travel times when using private cars, with about 30.6% of respondents estimating their in-vehicle travel time for daily activities like work and education at just 0-15 minutes, regardless of whether it is peak or off-peak hours. This suggests a high degree of efficiency or a minimal perception of traffic delays. However, when it comes to public transport, there is a noticeable difference. Although no significant delays are anticipated, the travel time is generally perceived as longer, typically falling between 15-45 minutes. This perception positions public transport as a slower alternative to cars. Interestingly, for those opting for active modes of transport like cycling and walking, there is an expected increase in travel time - by 15 and 30 minutes, respectively. Yet, these modes are seen as largely independent of the kinds of delays related to traffic congestion. Figure 29 presents the previously described insights.

Geneva presents a unique scenario where the differences in perceived travel time via private car between peak and non-peak hours are stark, with less than 5% of respondents reporting consistent in-vehicle travel times across these periods. Taxis are perceived as a quicker alternative, while public transport is seen as more resilient to peak-hour disruptions compared to private cars. Motorcycles are viewed as the quickest mode of tranport, with a significant 75.0% believing they can perform their daily trip within a 15-minute window. For cycling and walking, there is a sense of robustness, with 61.4% of cyclists and 54.0% of walkers expecting their journeys to last around 0 and 15 minutes both at peak and non-peak hours, respectively. However, a small but noteworthy 5.9% believe that walking to their daily activities would take more than 45 minutes, highlighting the limitations of this mode for longer distances. Figure 30 presents the previously described insights.

In **Jerusalem**, car and taxi present a notable deviation in travel times between peak and off-peak hours. The travel delays due to traffic congestion at peak hours are estimated between 15 and 45 minutes. Yet, the public transport options are quite slow. For the 14.9% of respondents, the trip to one daily activity will take up to 45 minutes both at peak and non-peak hours. Motorcycle is quite fast, since the 69.5% of respondents believe that they can reach their destination within 15 minutes. The same proportion for bicycle and walking is equal to 33.3%, respectively. Bicycle and walking (reported) travel times seem not to present any variation due to the time period. Figure 31 presents the heatmaps for Jerusalem.

In **Athens Penteli**, the perception of travel time by car shows a marked difference between peak and off-peak hours. During non-peak hours, car travel is expected to take 0-15 minutes, but this extends to 15-30 minutes during peak hours, indicating an expected delay of about 15 minutes. Despite this, public transport does not appear to be a more attractive option, around 85% of respondents believe that it would take them at least 30 minutes to reach their destination using this mode. Motorcycles stand out as the perceived fastest mode of transport with reduced delays, even over longer distances. When it comes to cycling, it is interesting to note that people do not expect a significant increase in travel time compared to driving. However, walking is a different story, with many estimating it to take at least 30 minutes longer than driving, and a notable 11.5% of respondents believing it would take them over 90 minutes to reach their destination on foot. The heatmaps of Figure 32 give the relationships between in-vehicle peak and off-peak travel time. Of course, the main diagonal concentrates on respondents who believe that there is no actual difference between these two periods.

In **Rotterdam**, the perceptions are quite surprising, with a majority of respondents across almost all transport modes - except walking - believing they can reach their destinations within a mere 0-15 minutes. This extremely low perceived in-vehicle travel time could be reflective of the city efficient transport infrastructure and a dense city. Walking is slightly different, with 11.4% of people estimating 30-45 minutes travel time. Taxis and motorcycles are considered exceptionally fast. However, public transport and cycling exhibit small variations in travel times during peak and non-peak hours. Notably, cycling seems to experience its form of congestion, likely due to the high cycling usage that was reported before. The results from this analysis in Rotterdam are visualized in Figure 33.

Krakow' public transport system is perceived as slow and particularly susceptible to peak hour disturbances, as a significant number of respondents placed their estimated travel times outside the expected norms. Using a private car seems to offer a substantial reduction in travel time, estimated at around 20 minutes less compared to other modes. The perceived walking time is notably high, with 40.5% of respondents estimating it would exceed 90 minutes for certain distances. Cycling, however, is seen as a much quicker option, with estimated travel times hovering around 15-45 minutes, like taxis and private cars. Motorcycles emerge as the fastest mode, offering a reduction of about 15 minutes in in-vehicle travel time. The heatmaps of Figure 34 give the relationships between in-vehicle peak and off-peak travel time.

In **Fredrikstad,** the perception of travel time by car is quite consistent, with 37.2% of people estimating about 15 minutes of travel time during both peak and non-peak hours. Taxis follow a similar pattern. However, public transport is viewed differently, with 11.1% of respondents estimating a travel time of 15-30 minutes and 15.6% estimating 30-45 minutes at peak hours. This suggests a perception of greater disturbance in public transport, especially over longer distances. Motorcycles are again seen as a quick mode, with 50.0% believing in-vehicle travel times would be within the 15-minute range. Cycling is also perceived favorably, with 44.9% estimating a 0 to 15 minute travel time. Walking, however, is largely seen as impractical due to long distances, with 22.6% of respondents estimating a walking time of 30-45 minutes. The heatmaps of Figure 35 give the relationships between in-vehicle peak and off-peak travel time.

In **Larnaca**, a notable proportion of commuters, 16.4% of respondents, observed a significant difference in travel time during peak and non-peak hours, with a reported delay of about 15 minutes. Interestingly, for approximately 39% of the people using buses and public transport, the travel times remain consistent regardless of the time of day. Overall, the survey data indicate general trend of varied travel times between peak and non-peak hours across almost all transport modes. This reflects the impact of traffic congestion and the efficiency of the urban transport system during different times of the day. The heatmaps of Figure 36 give the relationships between in-vehicle peak and off-peak travel time.

In **Coimbra**, the perception of travel time by car also shows a significant difference between peak and off-peak hours. During non-peak hours, car travel is expected to take 0-15 minutes, but this extends to 15-30 minutes during peak hours, indicating an expected delay of about 15 minutes. Despite this, public transport does not appear to be a more attractive option, more than the 70% of respondents believe that it would take them at least 30 minutes to reach their destination using this mode. Motorcycles stand out as the perceived fastest mode of transport but with 15 delays at peak hours. When it comes to cycling, people expect a significant increase in travel time. However, walking is a different story, with many estimating it to take at least 30 minutes longer than driving, and a notable 32.6% of respondents believing it would take them over 90 minutes to reach their destination on foot. The heatmaps of Figure 37 give the relationships between in-vehicle peak and off-peak travel time.

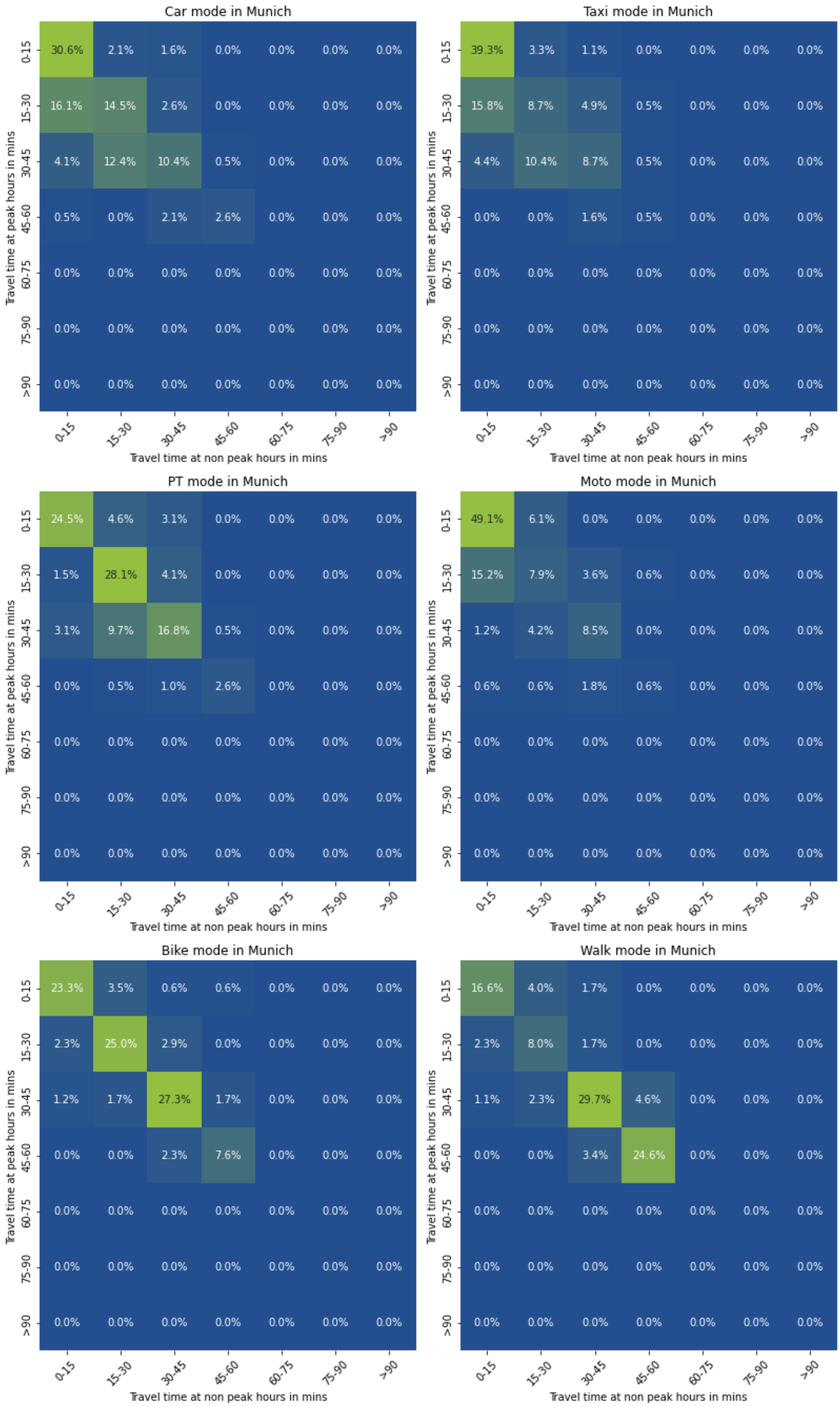

Figure 29. In-vehicle travel time per transport mode in Munich – off-peak (x-axis) vs peak hour (y-axis)

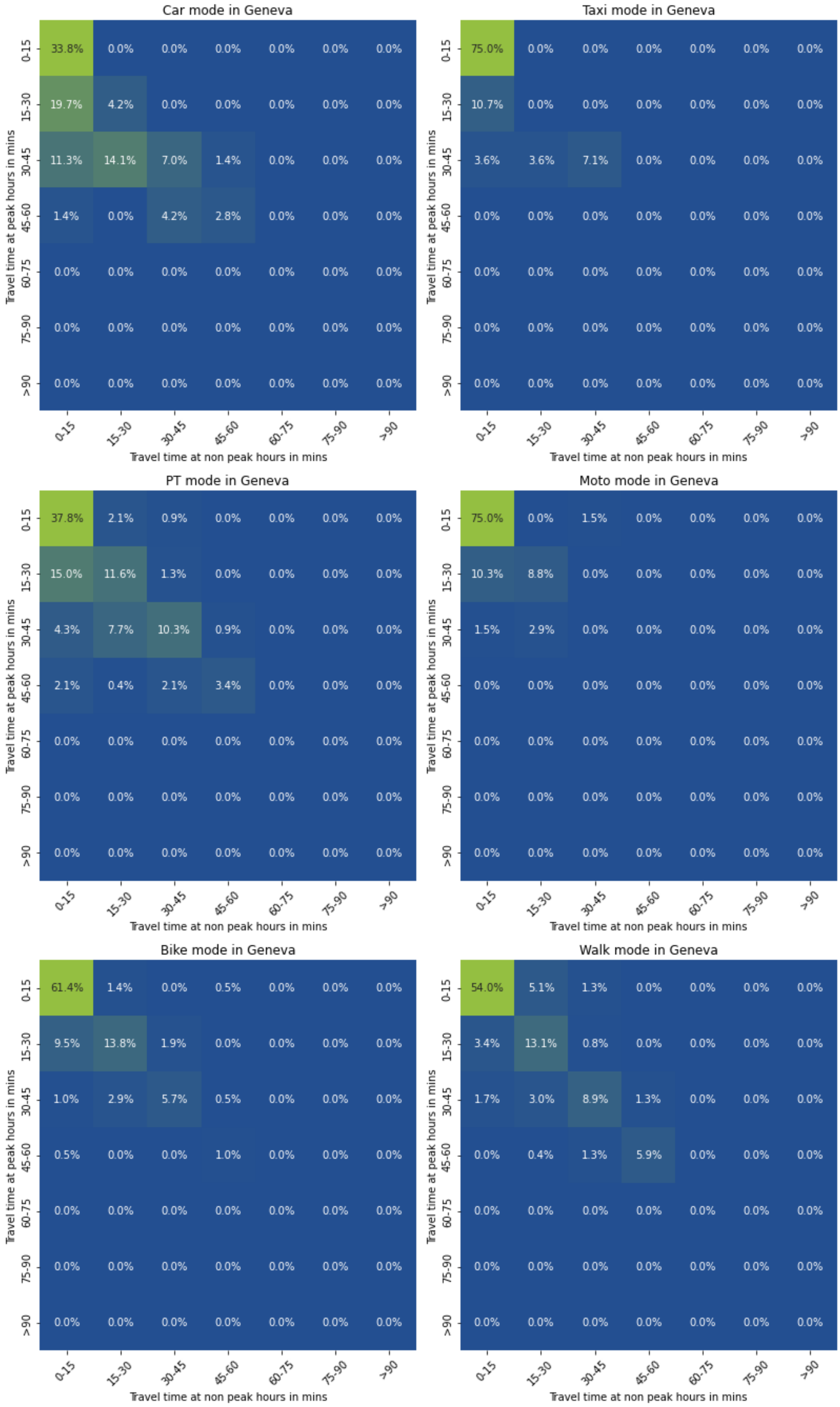

Figure 30. In-vehicle travel time per transport mode in Geneva – off-peak (x-axis) vs peak hour (y-axis)

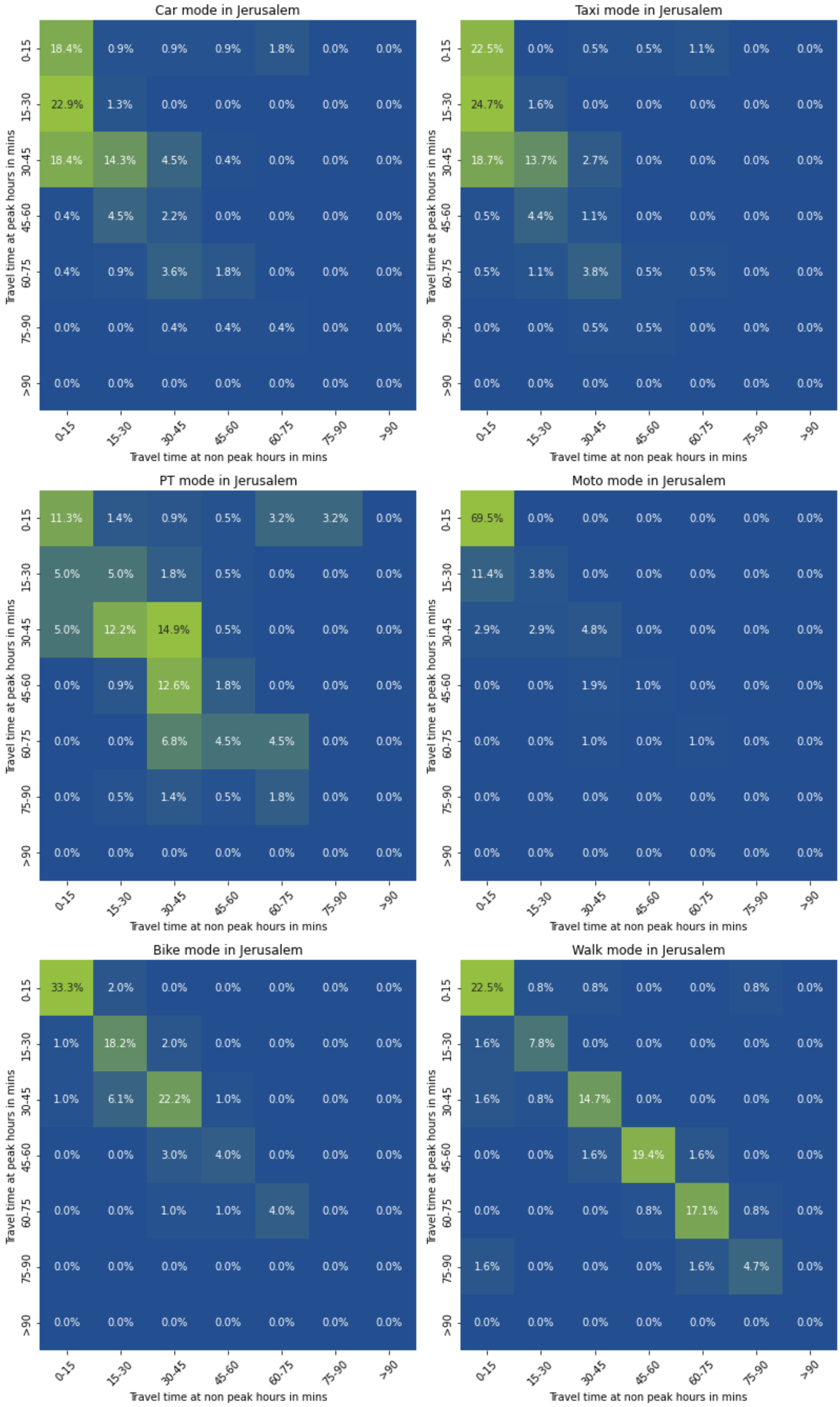

Figure 31. In-vehicle travel time per transport mode in Jerusalem – off-peak (x-axis) vs peak hour (y-axis)

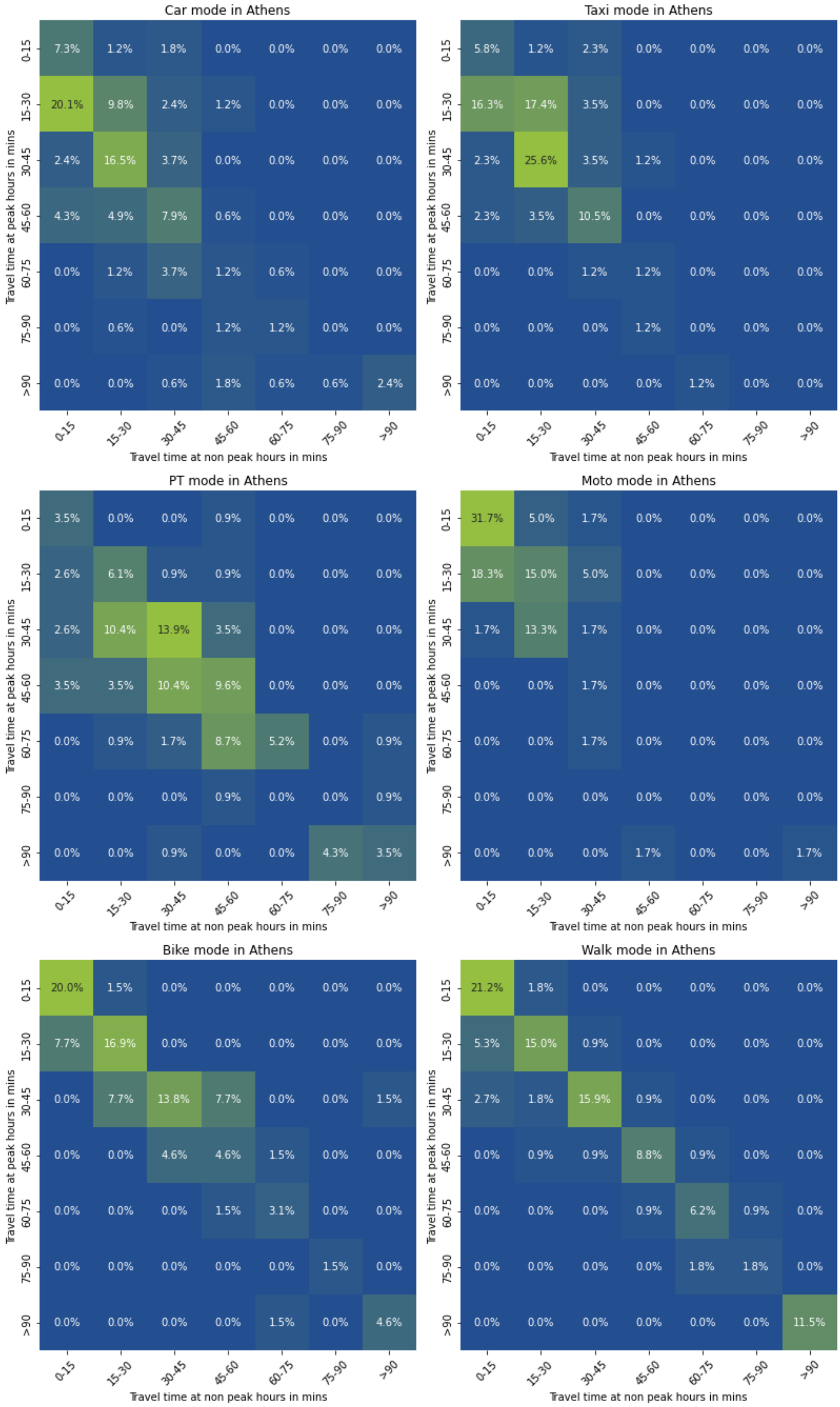

Figure 32. In-vehicle travel time per transport mode in Athens – off-peak (x-axis) vs peak hour (y-axis)

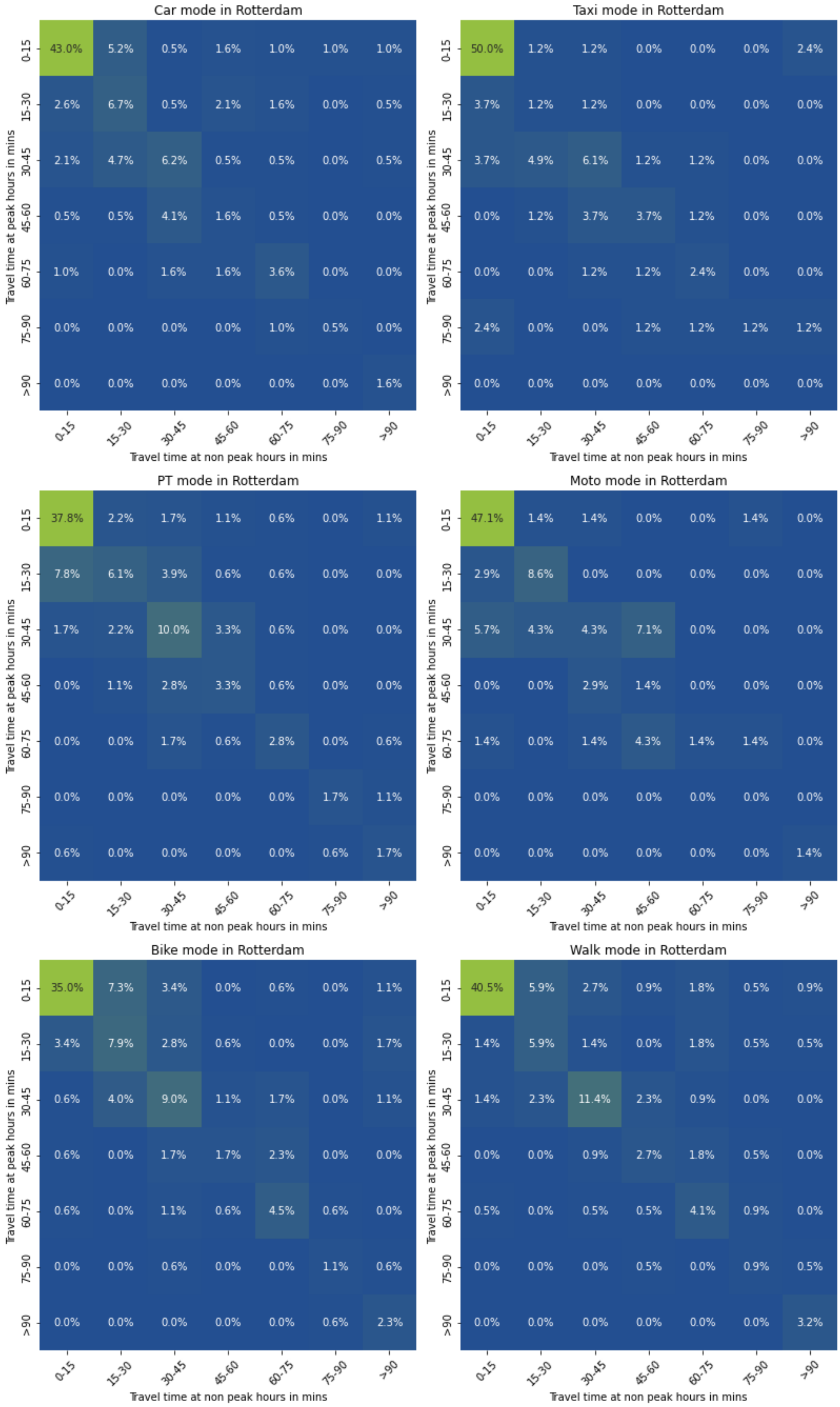

Figure 33. In-vehicle travel time per transport mode in Rotterdam – off-peak (x-axis) vs peak hour (y-axis)

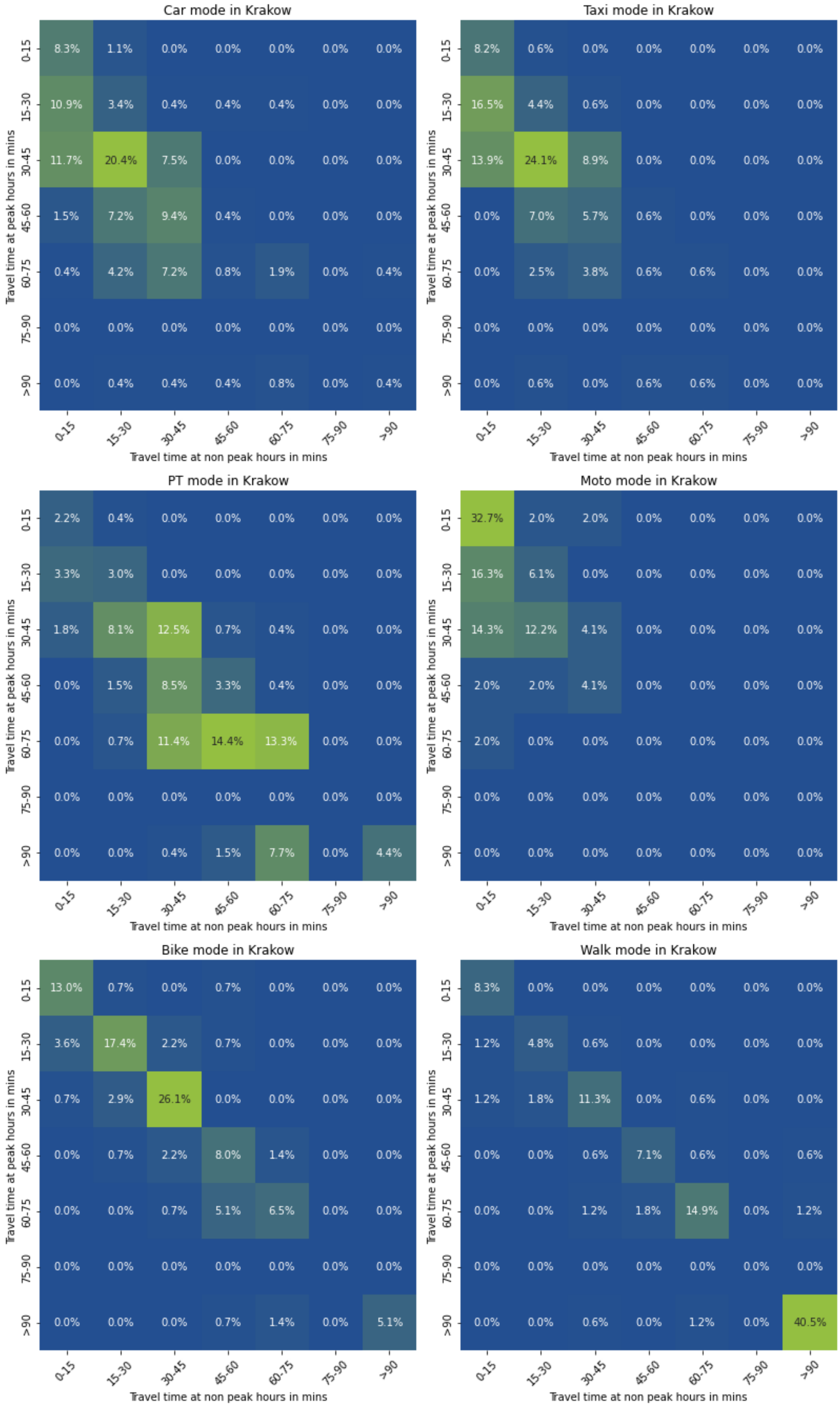

Figure 34. In-vehicle travel time per transport mode in Krakow – off-peak (x-axis) vs peak hour (y-axis)

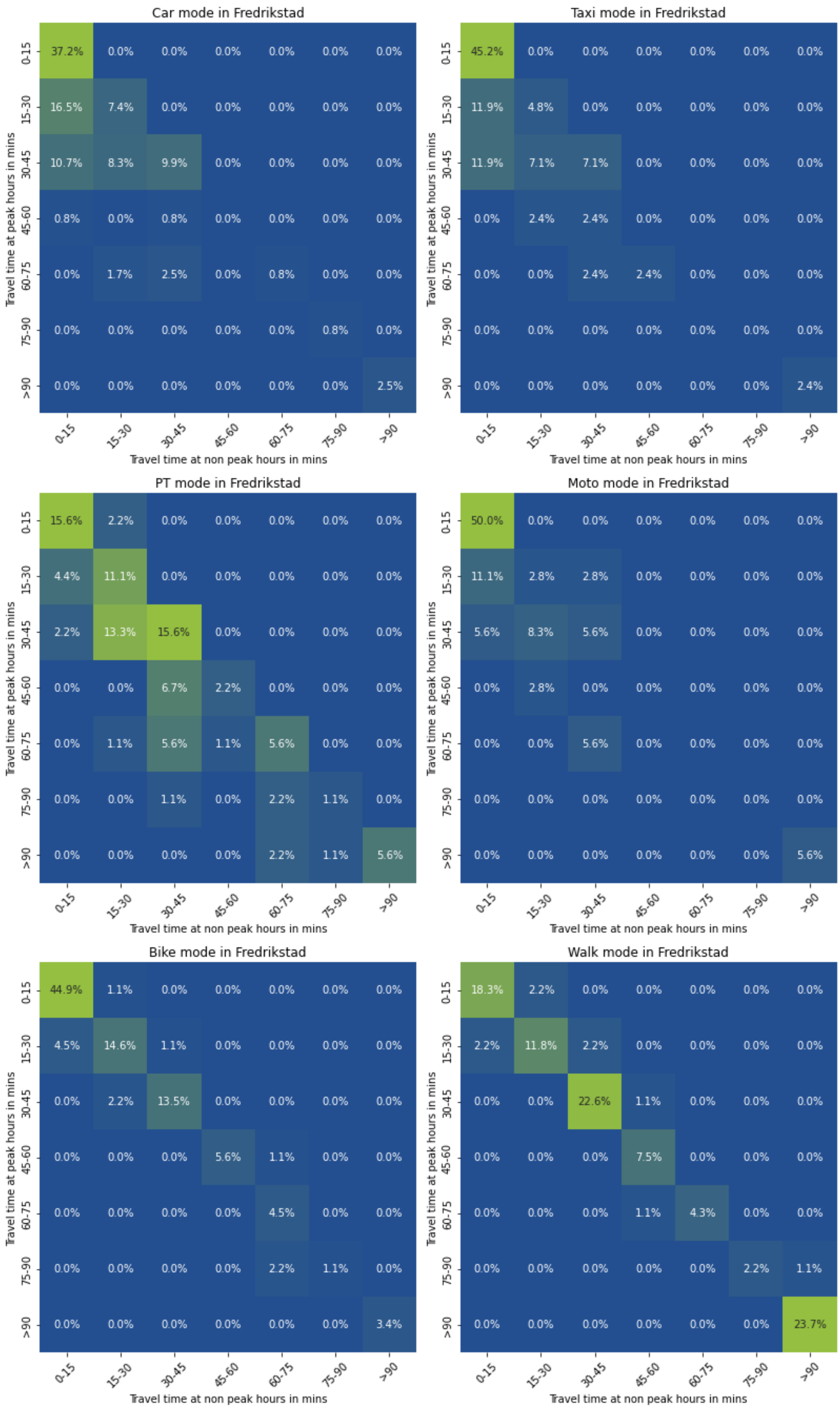

Figure 35. In-vehicle travel time per transport mode in Fredrikstad – off-peak (x-axis) vs peak hour (y-axis)

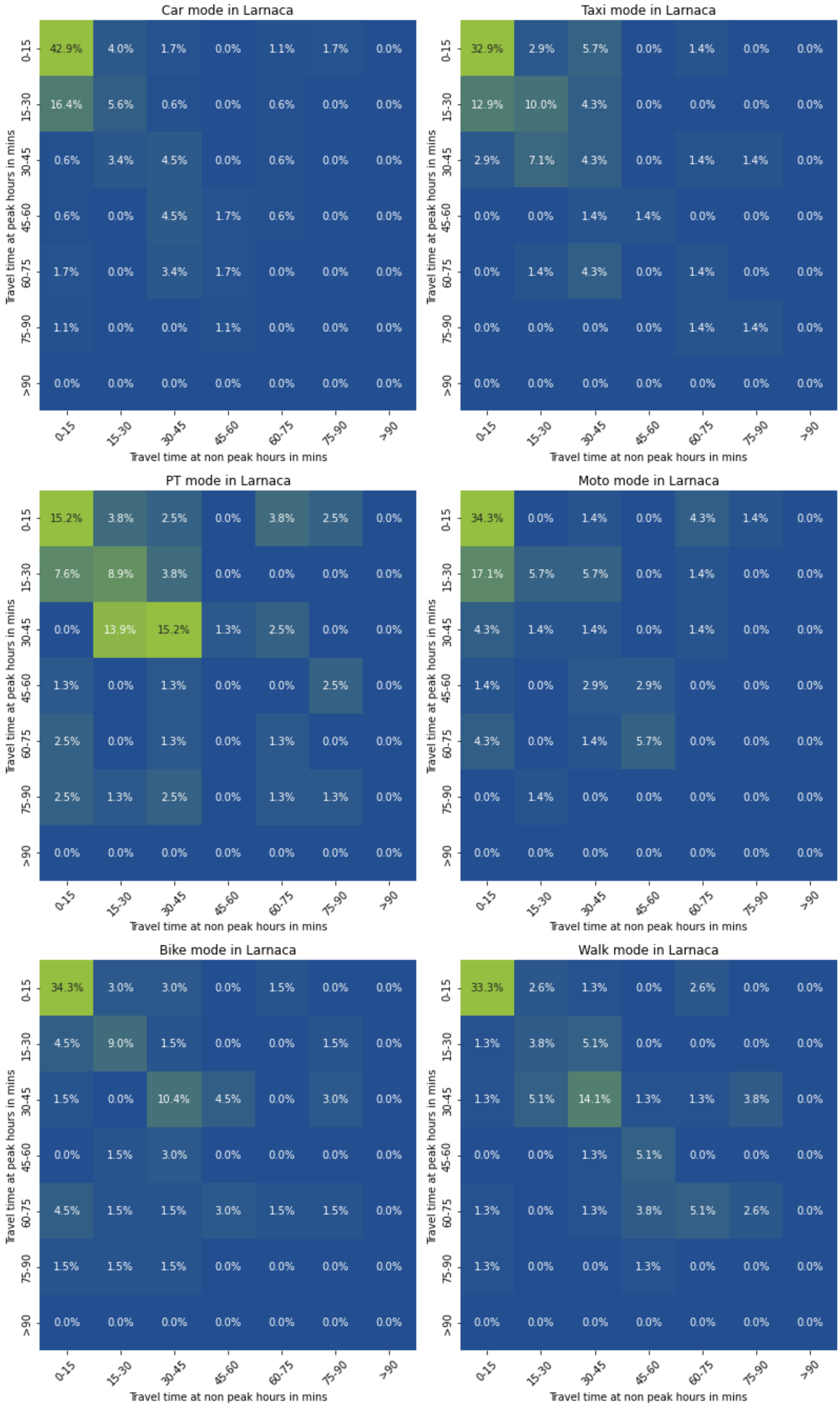

Figure 36. In-vehicle travel time per transport mode in Larnaca – off-peak (x-axis) vs peak hour (y-axis)

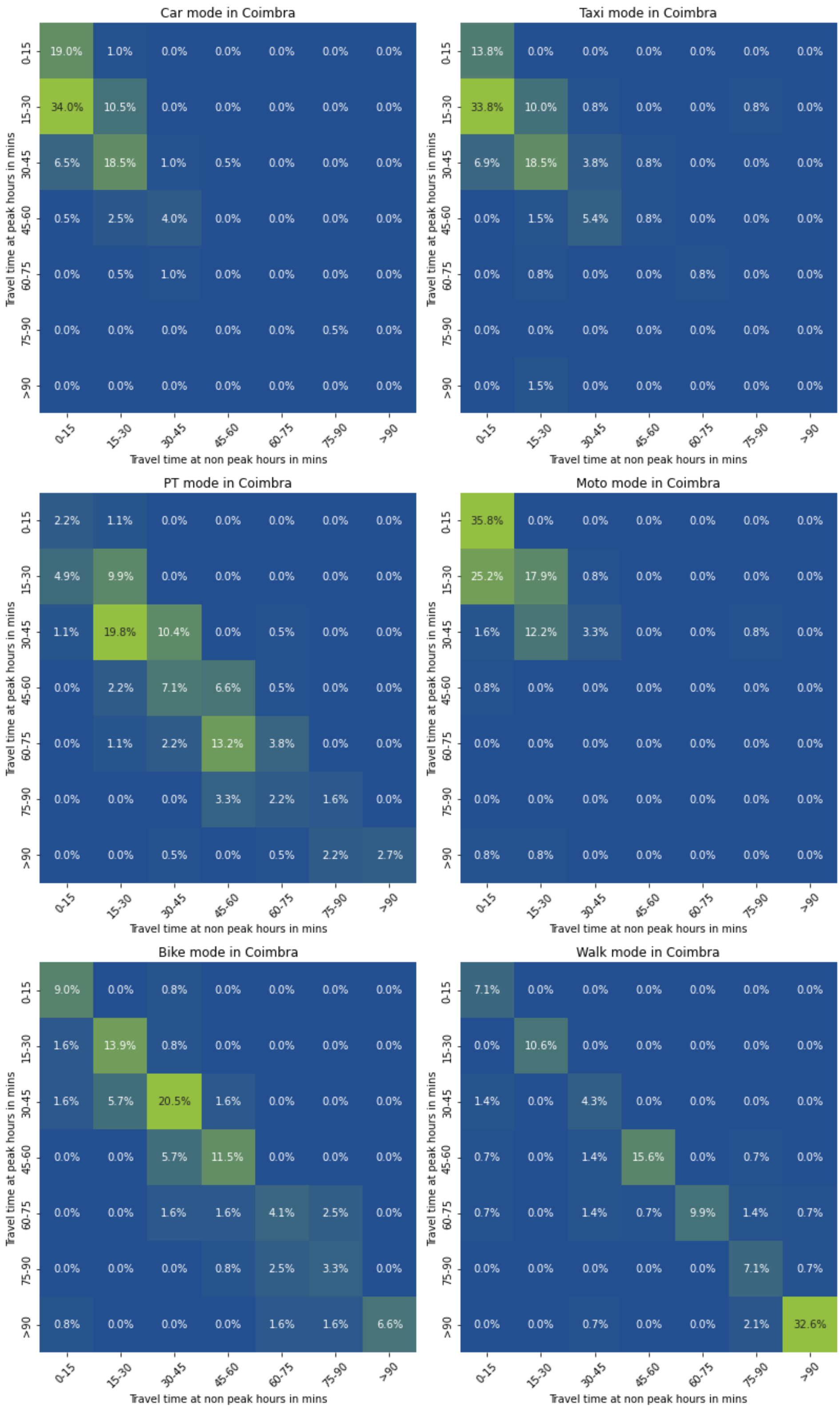

Figure 37. In-vehicle travel time per transport mode in Coimbra – off-peak (x-axis) vs peak hour (y-axis)

The interplay between perceived safety, in-vehicle travel time, and actual travel choices is a critical aspect of urban mobility. Safety concerns, particularly related to crash occurrence, can significantly deter individuals from using certain transport modes, like active modes. This perceived risk creates a tangible barrier to accessibility, often leading to a preference for 'safer' modes of transport, regardless of their speed or convenience.

In **Munich**, a notable 14.4% of respondents consider cars very unsafe, despite the ability to reach destinations within a 0–10-minute interval. The city has the lowest perceived safety rates across all transport modes, with safe ratings of 3 or higher not exceeding 25% for any mode. Walking is perceived as both the unsafe and slower mode, with an 21.3% safety rating at level 1 and estimated travel times of around 30-45 minutes. Cycling as a transport mode, however, sees most of the safety ratings concentrated at level 2, indicating a moderate level of safety concerns. Figure 38 presents the previously described insights.

In **Jerusalem**, the 11.1% of respondents rated traffic safety with 4, while their daily travel time to their destination is between 30-45 minutes. In the same time interval, public transport is perceived safer, as more responses are concentrated in the higher rates (from 4 to 6). Motorcycle and bicycle seem to be the fastest modes, and simultaneously, the least safe modes, according to respondents' perceptions. Indeed, 26.4% and 9.8% of 235 respondents believe that within 15 minutes, they can reach their daily destination with motorcycle and bicycle, respectively. Yet, they score these with the lowest value (1: very unsafe). Walking is perceived as a safe mode, but travel times seem to exceed the 30 minutes. Figure 39 shows the heatmaps of Jerusalem.

Contrastingly, **Athens Penteli** displays a high variance in perceived safety ratings across cars, taxis, and walking, indicating a high heterogeneity among individuals. This diversity in opinions is less pronounced in public transport, where more than 70% rate safety at level 3 or higher. However, public transport is not perceived as particularly fast, with travel times estimated between 30 to 45 minutes. Motorcycles and bicycles are seen as fast but unsafe, with cycling perceived as less safe than motorcycles. Despite safety concerns, motorcycles are recognized for their speed and ability to quickly reach destinations compared to other private modes in Athens. The heatmaps of Figure 40 give the relationships between in-vehicle peak travel time and perceived safety per transport mode.

The TPG, as the operator representing the **Geneva LL**, is responsible for service provision rather than public safety oversight, which falls under the jurisdiction of the municipality. Consequently, the questionnaire shared with commuters appropriately excluded safety-related questions.

Rotterdam presents an interesting case with generally short in-vehicle travel times of around 15 minutes. Public transport, followed by cars and taxis, is perceived as the safest mode of transport. Motorcycles are viewed as the least safe, while bicycles receive higher safety ratings, with levels 4 and 5 being the most common, accounting for 50% of responses. Walking is also considered safe and interestingly not viewed as a very slow mode even during peak hours. Figure 41 presents the previously described insights.

Krakow shows high variance in safety and time perceptions across all transport modes, indicating diverse preferences among its residents. Cars, taxis, and walking generally receive higher safety ratings (3 or higher). Public transport is considered very safe but with an extended travel time of 30-75 minutes. Motorcycles, while quick, receive more negative safety ratings. Some contradicting evaluations are presented in cycling, with safety perceptions ranging between levels 2 and 5, but travel times are mostly concentrated within the 15–45 minute range, compared to longer times for public transport. The heatmaps of Figure 40 give the relationships between in-vehicle peak travel time and perceived safety per transport mode.

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Fredrikstad also exhibits high variance in safety and time perceptions, except for motorcycles, which are consistently viewed as the least safe. Cycling follows in terms of safety concerns. A significant concentration of responses, 8.9%, falls within the category of very safe and more than 90 minutes of walking time, suggesting that walking is not a feasible and attractive option in Fredrikstad. The heatmaps of Figure 43 give the relationships between in-vehicle peak travel time and perceived safety per transport mode

The survey results depicted in the graphs for **Larnaca** transport modes reveal varied perceptions of safety and travel time at peak hours. Car users rarely experience over 30 minutes of delay, with safety concerns being minimal. Taxi passengers generally feel safe, although a significant number expect longer peak hour in-vehicle travel times. In public transport, respondents note moderate safety and some peak-time delays, while motorcycle riders report a quite wide range of travel time differences yet feel unsafe overall. Survey participants expressed substantial safety concerns for bicycle using, contrasting with pedestrians who largely feel very safe in this city. Figure 46 presents the previously described insights.

Coimbra also reports a considerably high variance in perceived safety ratings across all transport modes. This diversity in opinions is also pronounced in public transport, where the safety rate ranges from 1: very unsafe to 7: very safe. However, public transport is not perceived as particularly fast, with travel times estimated between 30 to 45 minutes. Motorcycles and bicycles are seen as fast but unsafe. Yet, there is a high standard deviation in safety ratings. Walking is very unsafe according to Coimbra citizens. The heatmaps in Figure 45 give the relationships between in-vehicle peak travel time and perceived safety per transport mode

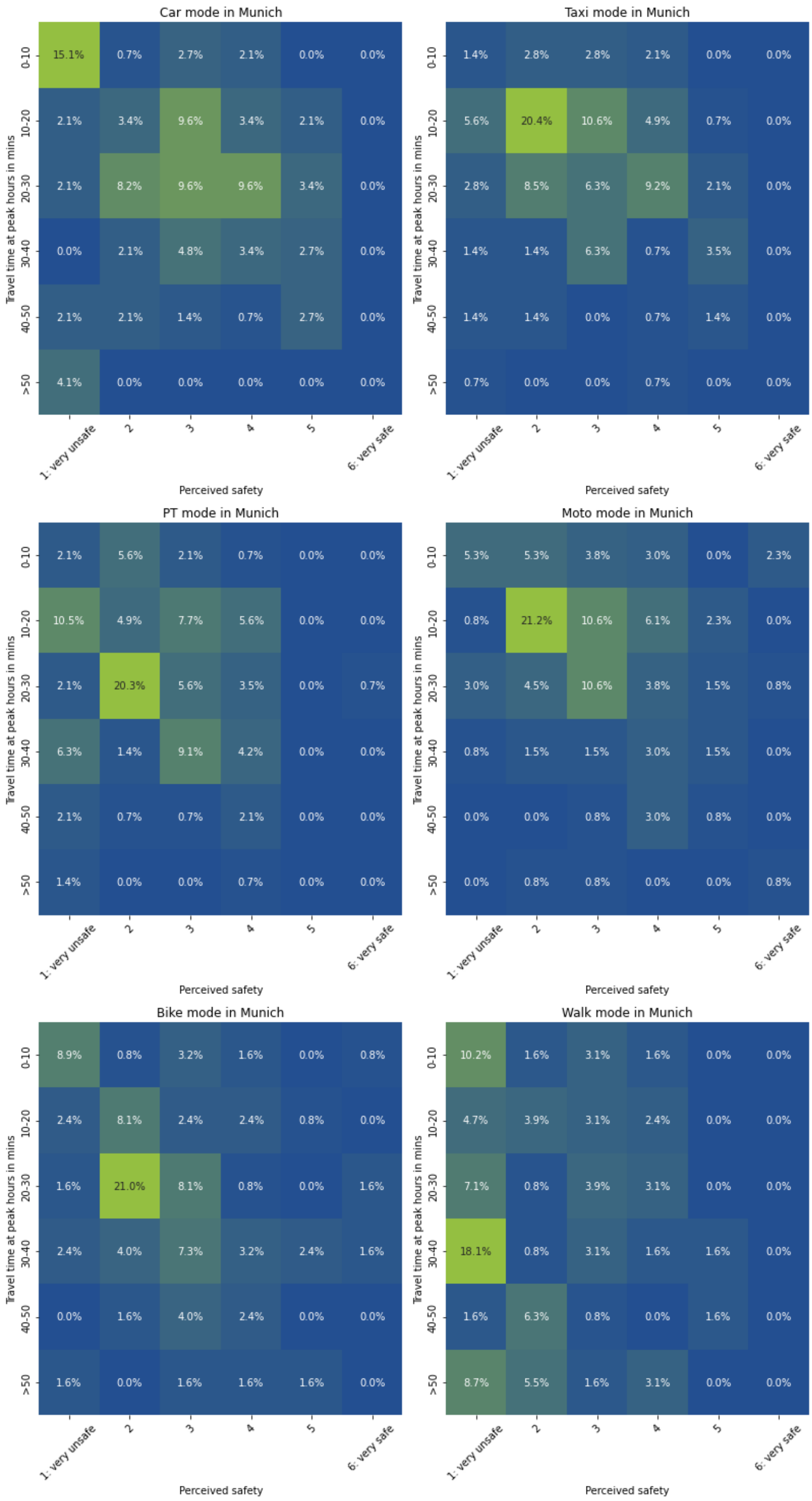

Figure 38. Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Munich

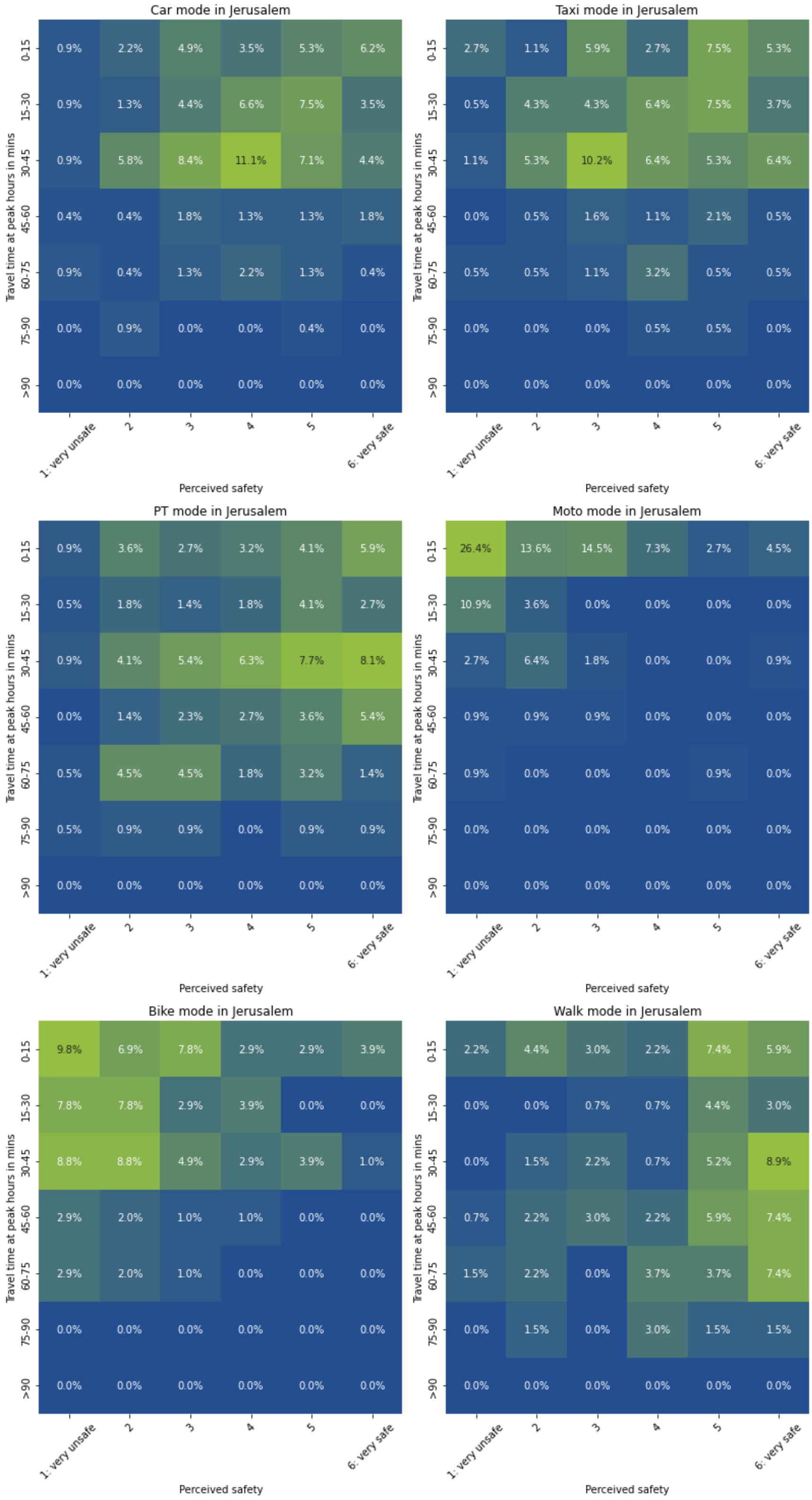

Figure 39. Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Jerusalem

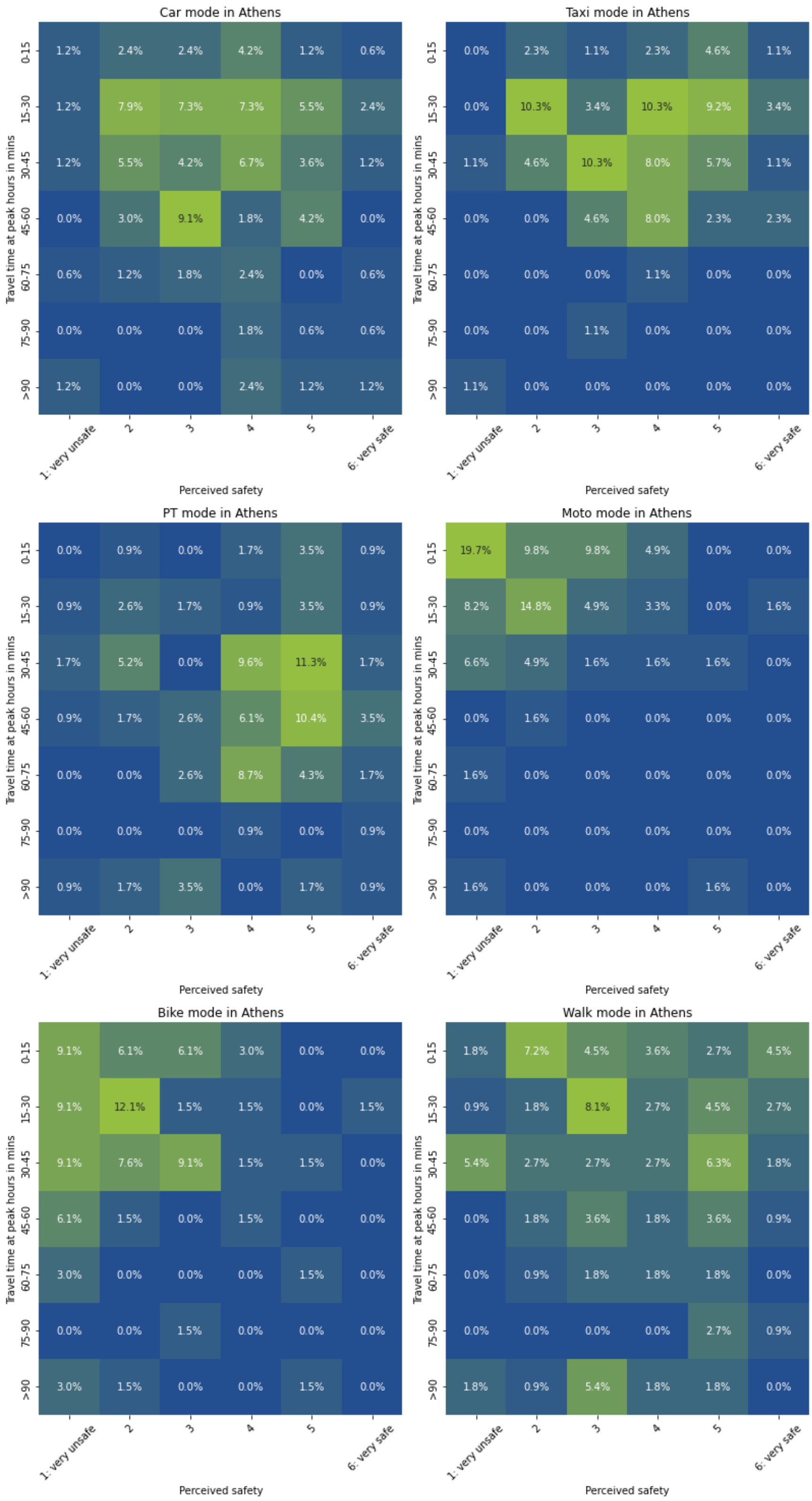

Figure 40. Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Athens Penteli

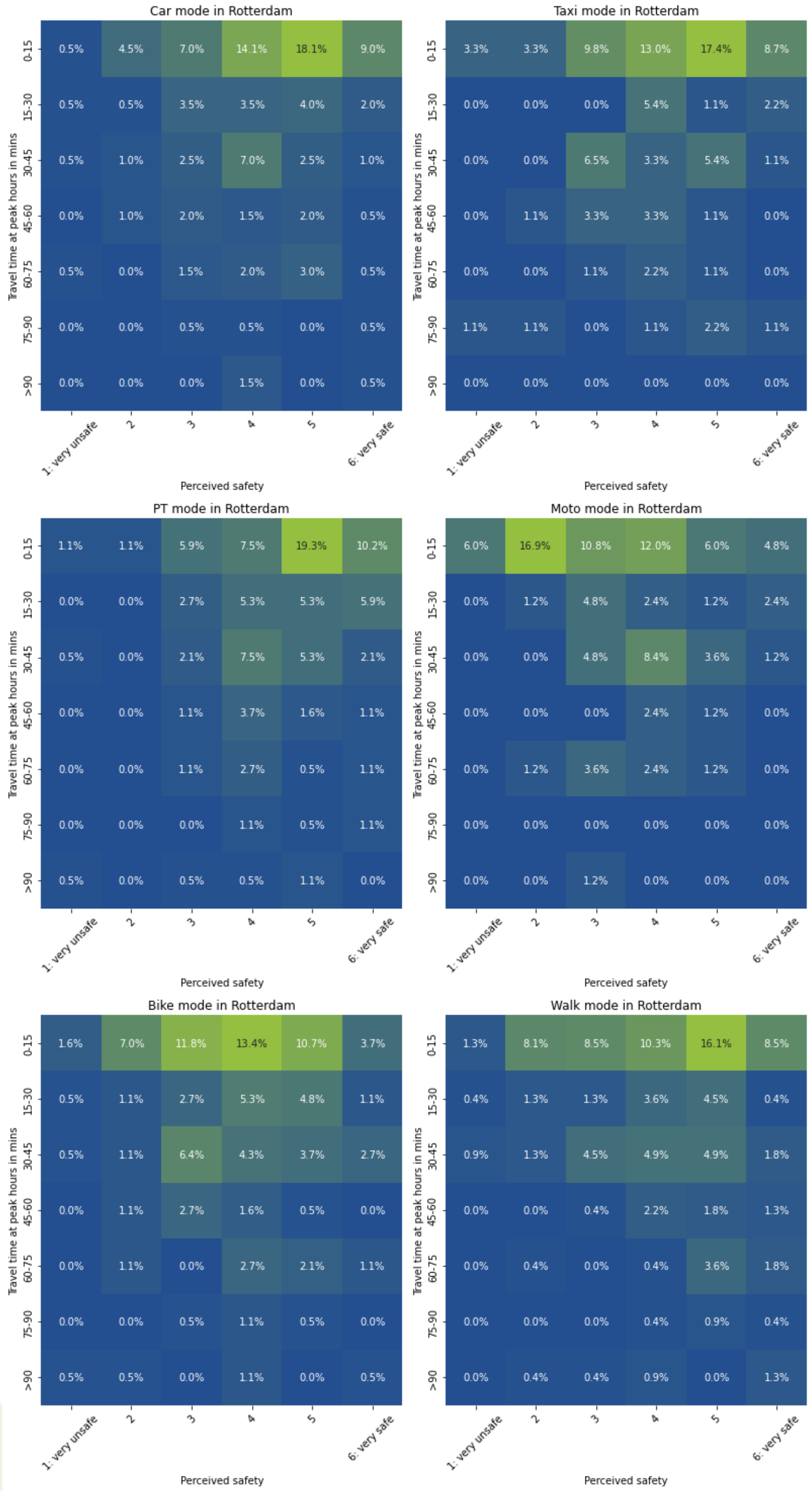

Figure 41: Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Rotterdam

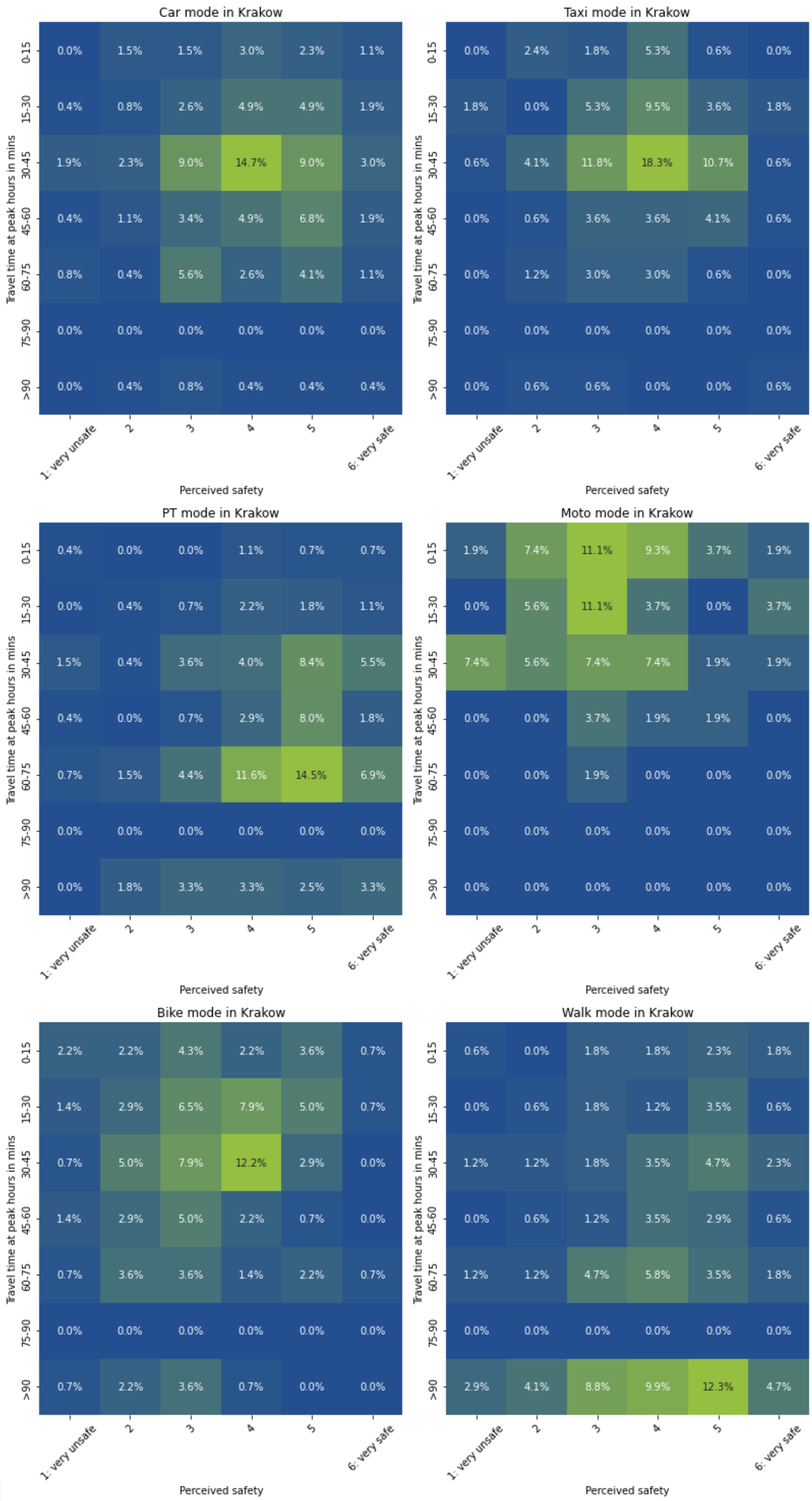

Figure 42. Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Krakow

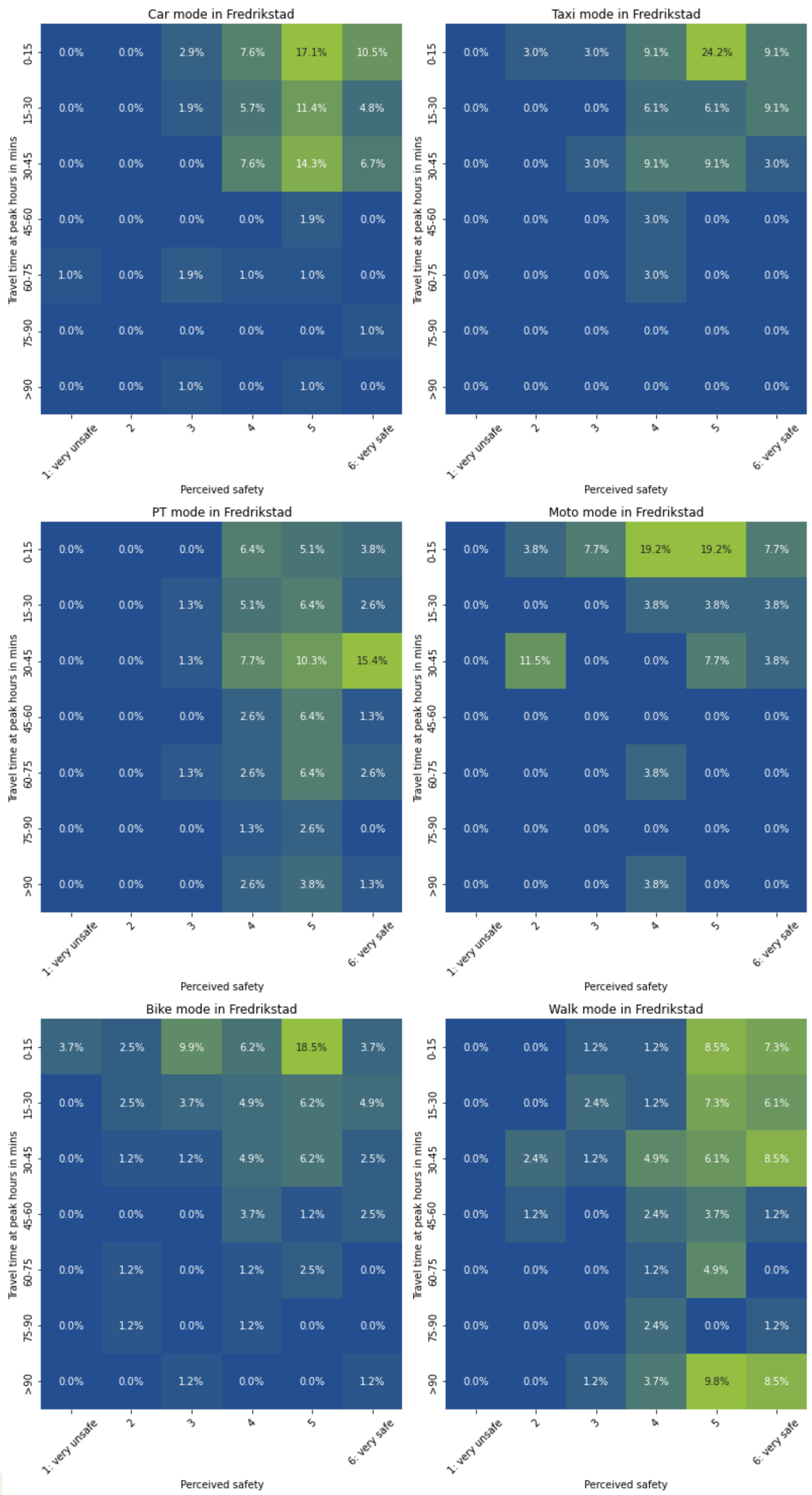

Figure 43. Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Fredrikstad

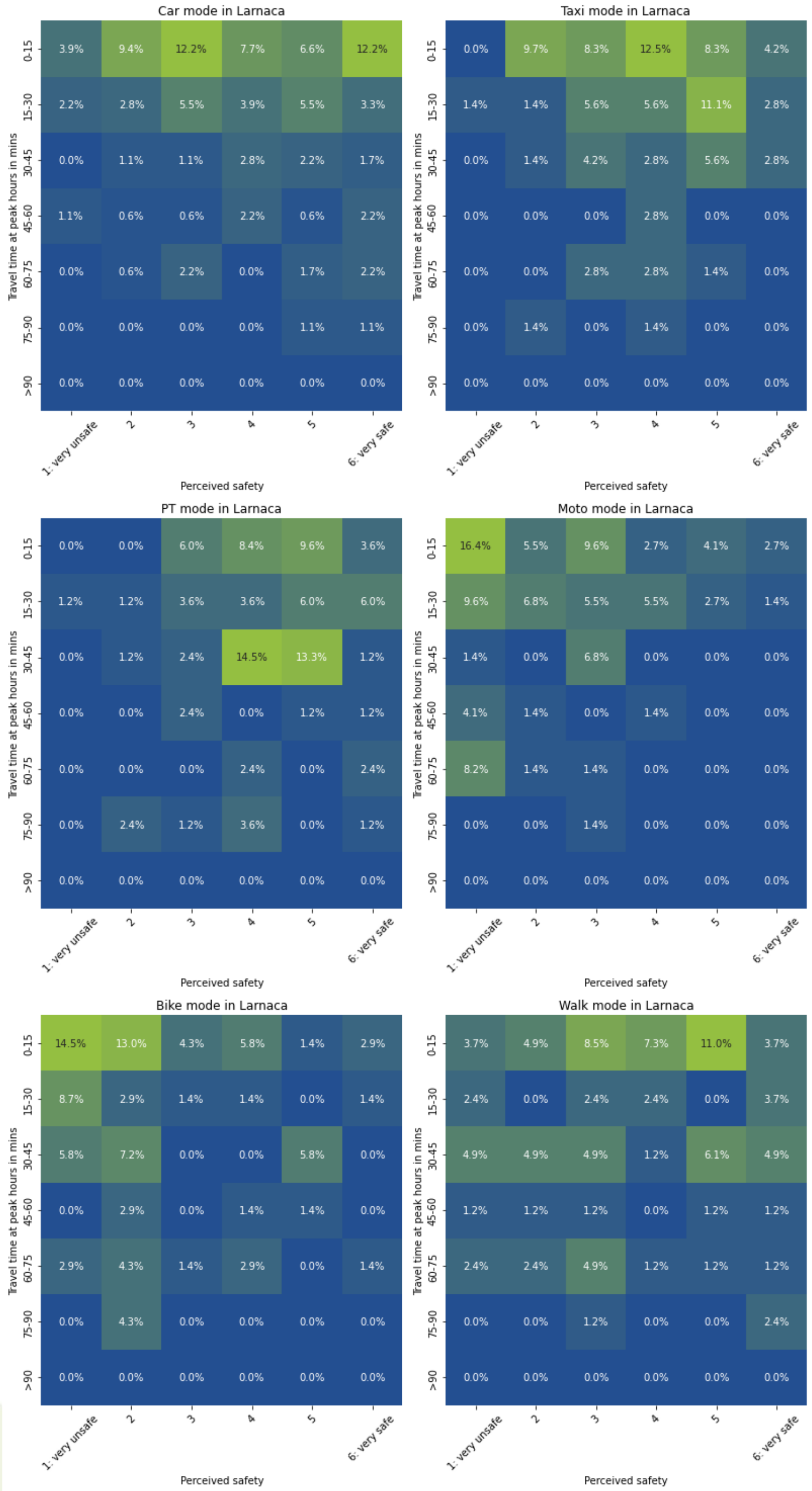

Figure 44. Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Larnaca

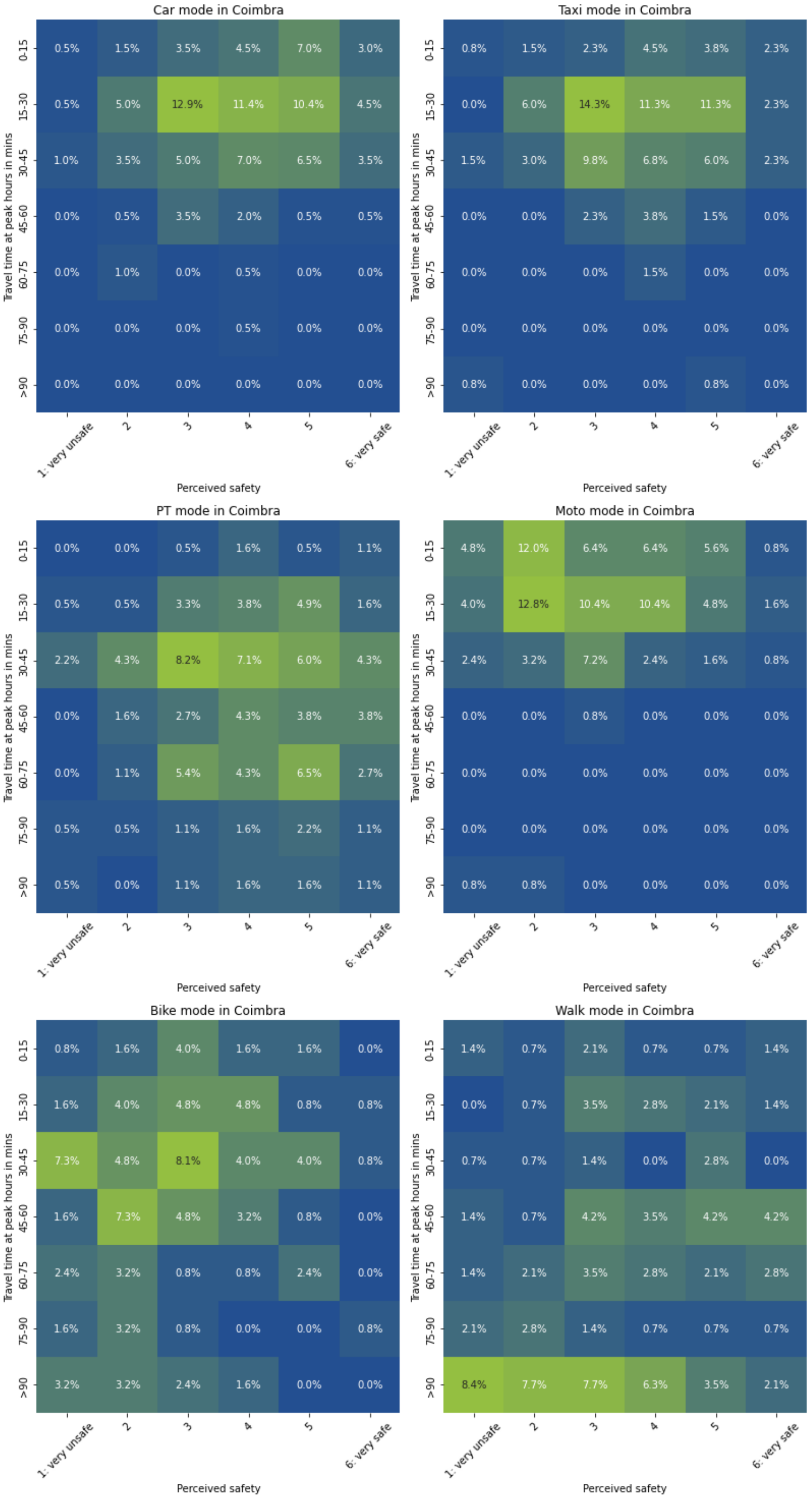

Figure 45. Perceived safety (x-axis) vs in-vehicle travel time (y-axis) per transport mode in Coimbra

The insights gleaned from the above findings are instrumental in shaping the acceptance of transport policies, as they closely interrelate with public perceptions and behaviors. In future stages of our research, the plan is to delve deeper into potential correlations, leveraging these connections to construct predictive models. These models are envisioned to be pivotal in crafting effective strategies and solutions.

When it comes to citizens' satisfaction with the provided mobility services, **Athens** shows a mean satisfaction score on the lower end, barely under 2.7, hinting at a desire for improvement in transport services. **Coimbra** has an even lower satisfaction score, with a mean of around 2.2, reinforcing the need for enhanced transport solutions. In contrast, **Fredrikstad** and **Krakow** exhibit higher satisfaction levels, with means above 3, suggesting a more favorable assessment. In **Jerusalem**, the mean score is equal to 3.3 out of 6, while **Larnaca** sits at a mean of 2.6. **Munich** and **Rotterdam**, like their policy acceptance scores, report high satisfaction means, approximately 4.4 and 4.5 respectively, indicating that residents are quite content with their transport systems. The next histograms (Figure 47 to Figure 53) give the distribution of satisfaction scores.

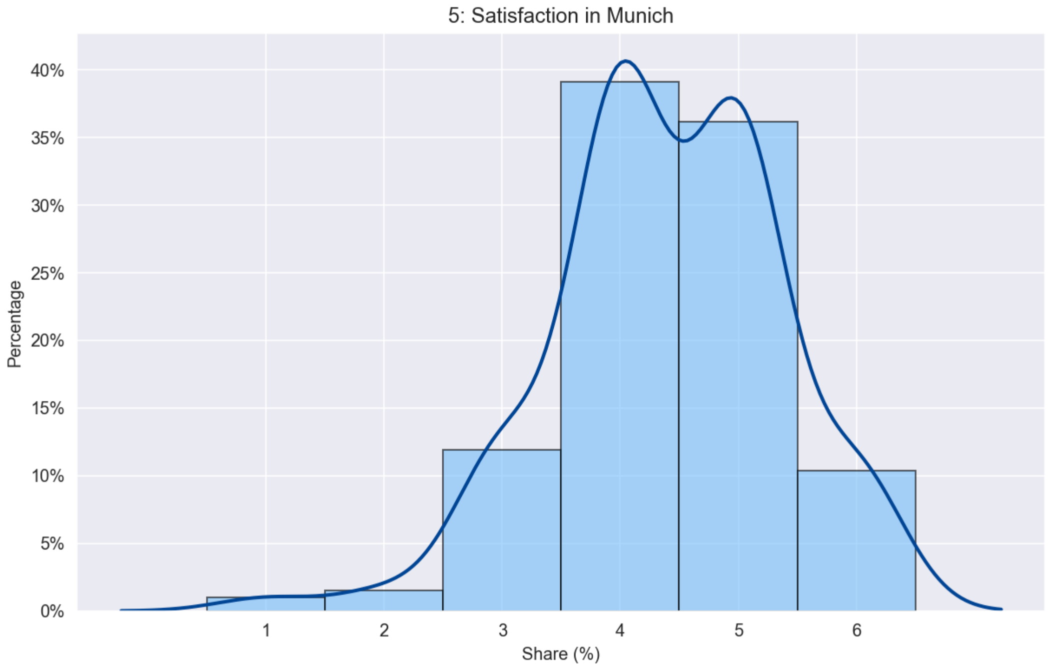

Figure 46. Satisfaction from the provided mobility services in Munich

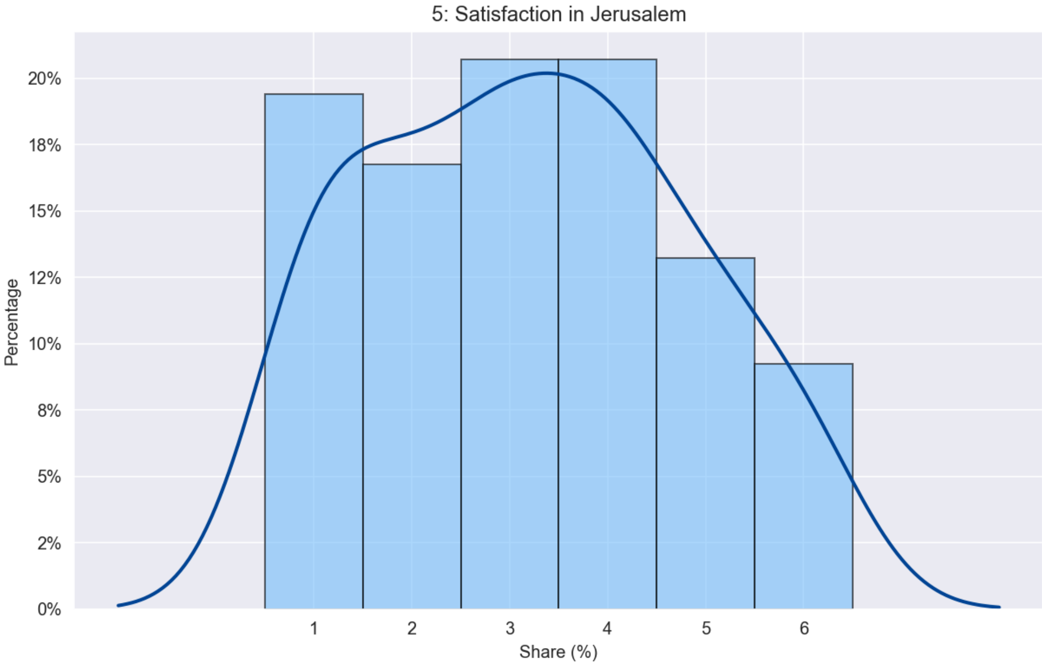

Figure 47. Satisfaction from the provided mobility services in Jerusalem

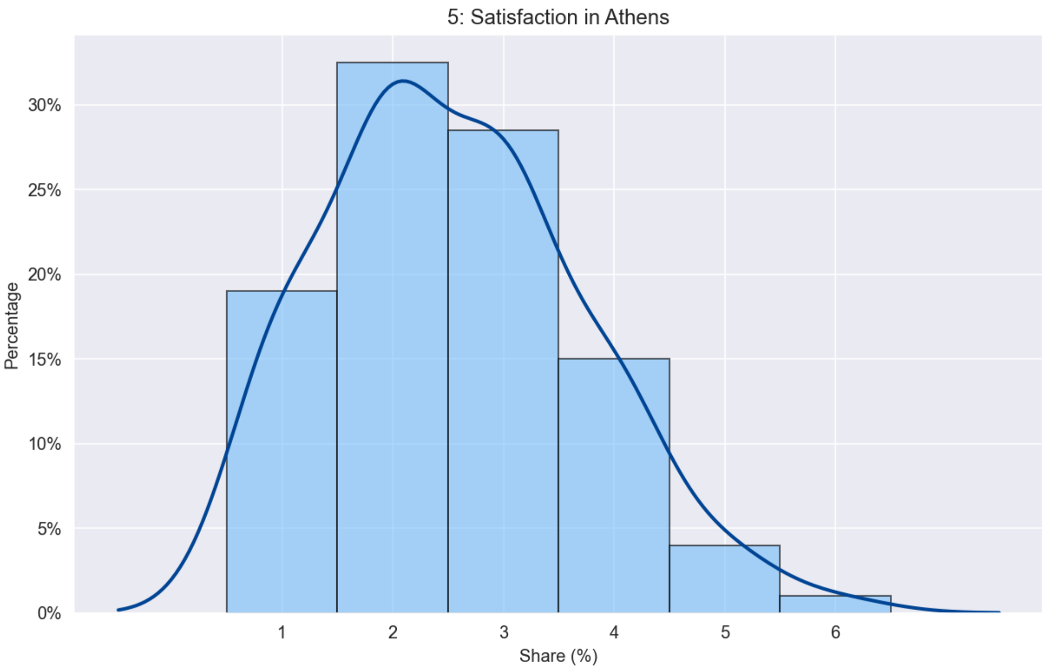

Figure 48. Satisfaction from the provided mobility services in Athens Penteli

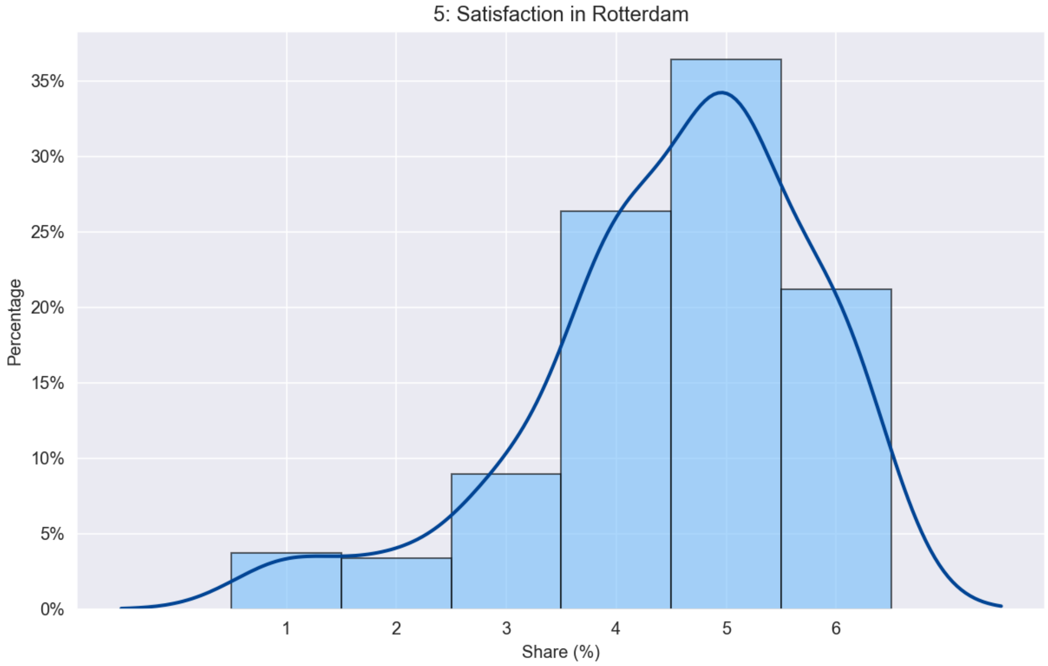

Figure 49. Satisfaction from the provided mobility services in Rotterdam

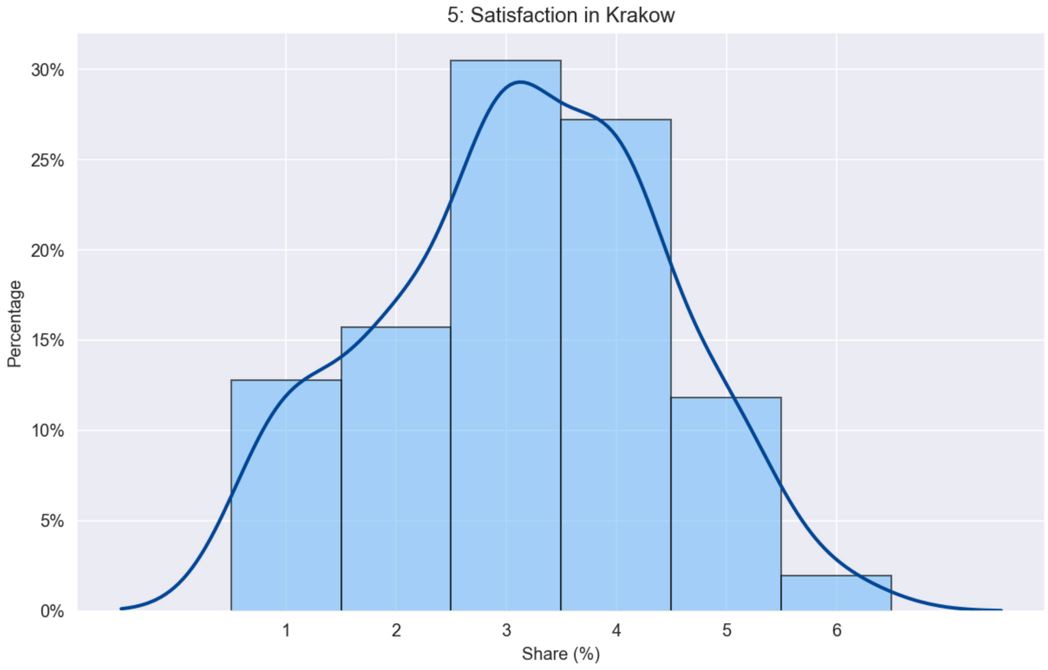

Figure 50. Satisfaction from the provided mobility services in Krakow

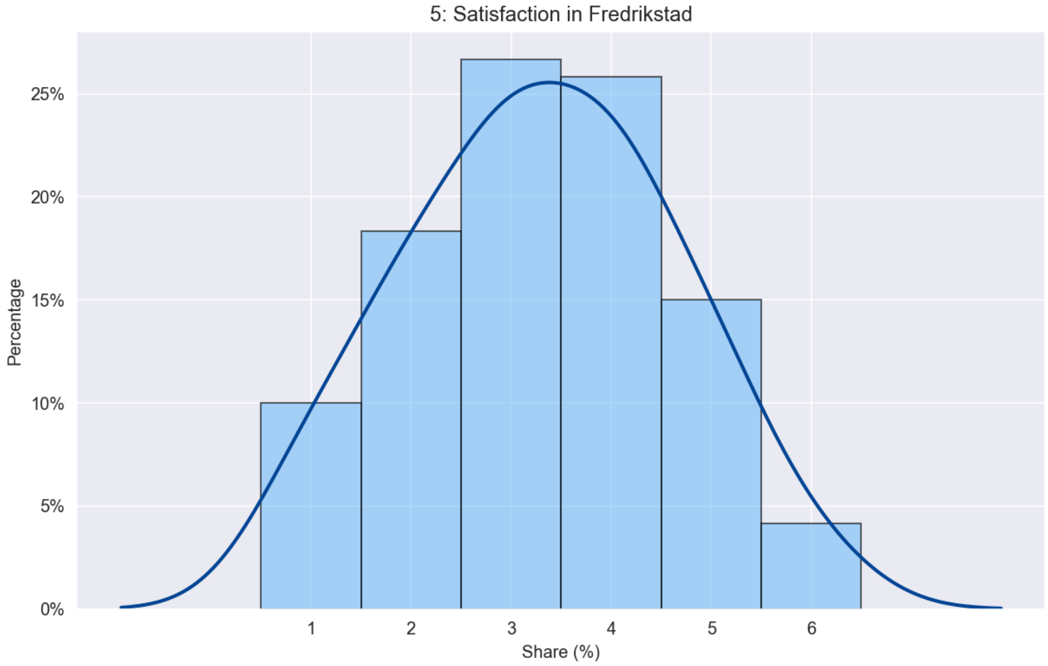

Figure 51. Satisfaction from the provided mobility services in Fredrikstad

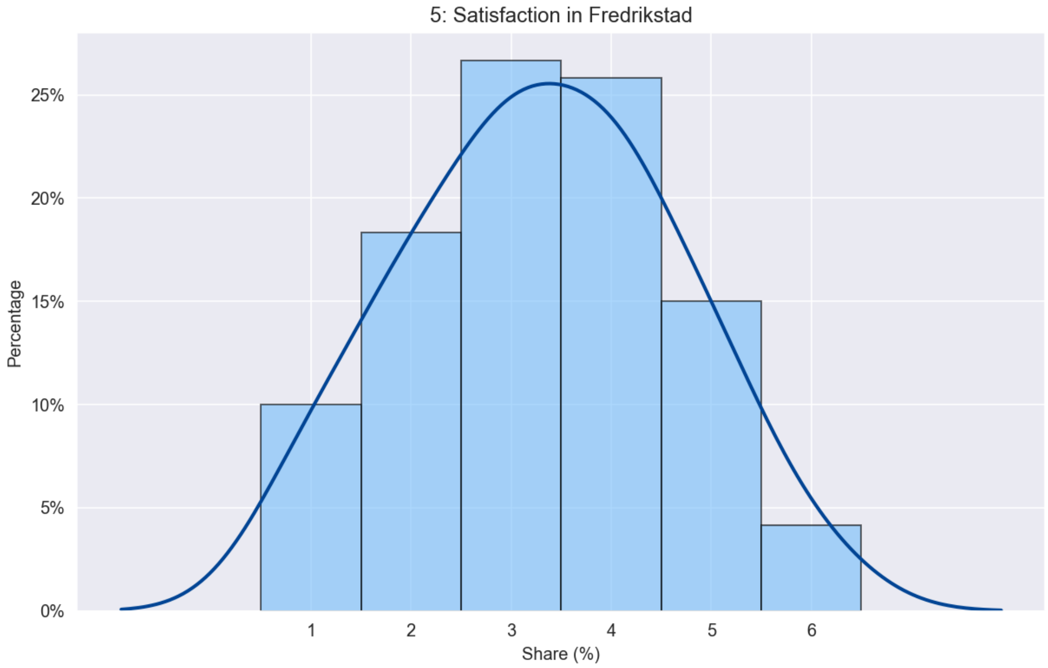

Figure 52.Satisfaction from the provided mobility services in Larnaca

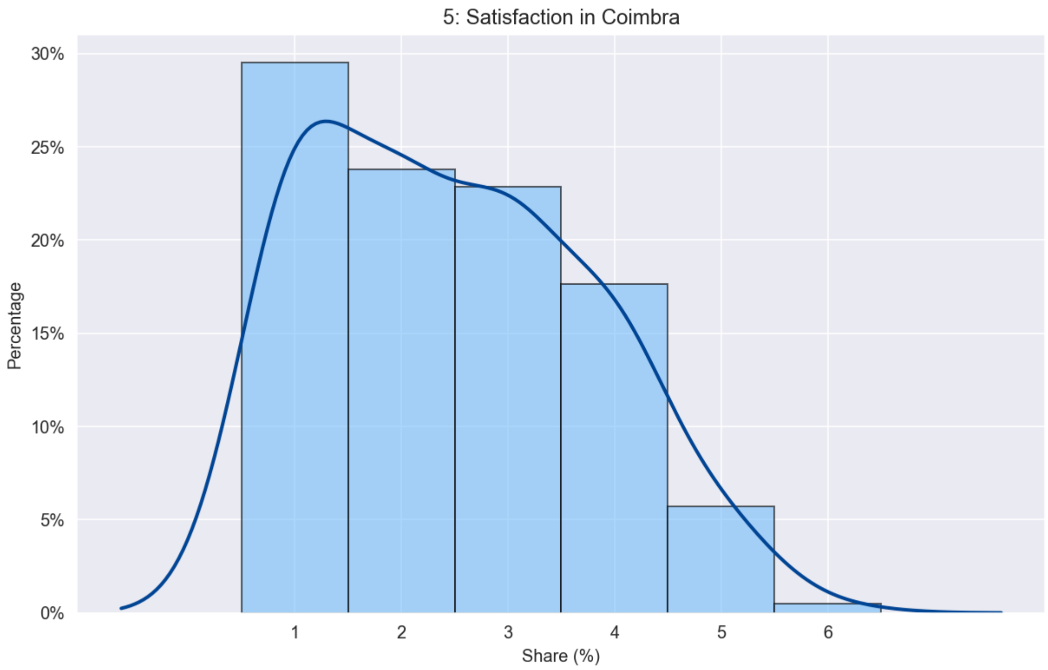

Figure 53. Satisfaction from the provided mobility services in Coimbra

6 Conclusions

The goal of this deliverable is to provide an analysis of the current modal split, integration of shared mobility, scheduled and applied policies and practices within the SUM LLs, to promote shared mobility solutions. For this purpose, a survey was created and shared with residents of each LL. The results of the survey were further analysed to evaluate current mobility status in each LL as well as to provide a basis for comparison after the implementation of the proposed mobility solutions.

Regarding the modal split, the results indicate a strong preference to private car usage in most of the LLs. Exceptions were observed in the Munich and Krakow LLs, where a relatively higher diversity of transport modes was observed. The LLs also demonstrate very diverse patterns with respect to the temporal distribution of trips across various transport modes, the in-vehicle times as well as the trips' purpose. In addition, the results reveal high variance in safety and time perceptions across all transport modes in each LL, indicating diverse preferences among the residents. Regarding the satisfaction of mobility solutions, most of the LLs (apart from Rotterdam and Munich) demonstrate low mean satisfaction scores, reinforcing the need for enhanced transport solutions.

Overall, the LLs in the SUM project have many similarities, but also a lot of differences. While all LLs have a shared goal of increased shared and active transport, the local circumstances are very diverse. Looking at the modal share in the different LLs, it's obvious that LLs with more active travel have relatively lower usage of private cars. Shared mobility can have a big impact on the attractiveness of active mobility by making cities more walkable and bikeable through the reduction of cars, but also by connecting bikeable or walkable areas.

The overarching objective of SUM is to contribute to the mobility transformation in European Cities towards new shared mobility modes integrated with public transport. This deliverable is the first important step towards analysing the current situation of the project's LLs in terms of shared mobility. As the data collection and analysis will be conducted at least twice within this project - both before and after the implementation of SUM measures - this ongoing study serves as a vital tool for measuring the overall performance of the transport system of each LL. It not only reflects immediate user perceptions but also sets the stage for measuring the longitudinal effects of transport policies.

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Annex A

Screenshot of the survey form written in English are presented in this Annex. The full survey can be found: https://forms.cloud.microsoft/e/GhhqiRguwm (Accessed: May 2025).

A Survey of Travel Preferences and Policy Views in - ADD LL NAME -

This survey is being conducted as part of the SUM project, funded by the European Union's Horizon Europ
research and innovation program (Project 101103646).

Description

The objective of SUM is to transform current mobility networks towards innovative and novel shared mobility systems integrated with public transport in 15 European Cities by 2026 and 30 European Cities by 2030. The project work will improve sustainable mobility and help decrease the emissions coming from transport.

The participating cities that act as living labs in this project are 1) Munich, Germany, 2) Geneva, Switzerland, 3) Jerusalem, Israel and 4) Athens - Penteli, Greece, 5) Rotterdam, Netherlands, 6) Krakow, Poland, 7) Fredrikstad, Norway, 8) Larnaca, Cyprus and 9) Coimbra, Portugal.

Great news!! Your city is one of the Living Labs. This means that in the next months, innovative shared mobility measures and strategies will be implemented and important interventions in the road infrastructure will take place. So now, we kindly ask you to participate in this process and help us. In this survey, you can describe your current travel preferences, evaluate the transport system, and assess the implemented transport policies.

In - CITY, COUNTRY -, the survey is conducted by the - HOST INSTITUTION OF EACH LIVING LAB -. It consists of 4 sections, namely: 1) Transport system evaluation, 2) Social acceptance and shared mobility usage, 3) Present travel behavior, and 4) Socio-demographic characteristics.
Overall, the survey includes 34 questions, and it will take 10 - 12 minutes (at most) to complete.

About your participation

Protecting your personal data is our top priority. To ensure this, we have put in place robust measures to safeguard the data you provide. Our data processing always complies with the obligations set by the legal framework, especially the General Data Protection Regulation (GDPR). By submitting the questionnaire, you consent to this data processing. Please note, that the questionnaire is anonymous and completed on a voluntary basis. You are free to withdraw from the survey at any time.

Transport system evaluation

Every day, you travel **within the municipality** for various daily activities. In this section, we'd like to gather your feedback about the transport system of you city.

Specifically, how satisfied are you with the current transport system available to you? Please provide some interesting details to help us understand!

1

What is approximately the **percentage** of your **monthly budget** you spend on your daily trips?

- ◯ 0 - 10%
- ◯ 10 - 20%
- ◯ 20 - 30%
- ◯ 30 - 40%
- ◯ 40 - 50%
- ◯ more than 50%

2

At off-peak hours, what is the **(in-vehicle) travel time** in minutes required to perform your daily trip per transport mode? Please provide an approximation.

** Please think of a trip you perform on a daily basis, i.e., from home to work or school/university.*

*** Please consider parking time as additional in-vehicle travel time.*

*** It is not necessary to use all these modes. Just assess based on your perceptions/thoughts.

	1-15	15-30	30-45	45-60	60-75	75-90
Car	◯	◯	◯	◯	◯	◯
Taxi or ride-hailing	◯	◯	◯	◯	◯	◯
Public transport	◯	◯	◯	◯	◯	◯
Motorcycle	◯	◯	◯	◯	◯	◯
Bicycle, e-bike or e-scooter	◯	◯	◯	◯	◯	◯
Walking	◯	◯	◯	◯	◯	◯

3

At peak hours, what is the **(in-vehicle) travel time** in minutes required to perform your daily trip per transport mode? Please provide an approximation.

** Please think of a trip you perform on a daily basis, i.e., from home to work or school/university.*

*** Please consider parking time as additional in-vehicle travel time.*

*** It is not necessary to use all these modes. Just assess based on your perceptions thoughts.

	1-15	15-30	30-45	45-60	60-75	75-90
Car	◯	◯	◯	◯	◯	◯
Taxi or ride-hailing	◯	◯	◯	◯	◯	◯
Public transport	◯	◯	◯	◯	◯	◯
Motorcycle	◯	◯	◯	◯	◯	◯
Bicycle, e-bike or e-scooter	◯	◯	◯	◯	◯	◯
Walking	◯	◯	◯	◯	◯	◯

4

What is the **mean walking time** in minutes required to reach the following Public Transport Stop/Stations? Please provide an approximation.

	0-10	10-20	20-30	30-40	40-50	more th 50 minu
closest Bus stop	◯	◯	◯	◯	◯	◯
closest Train/Metro/Tram station	◯	◯	◯	◯	◯	◯

5

What is the **mean waiting time** in minutes at the following Public Transport Stop/Stations? Please provide an approximation.

	0-5	5-10	10-15	15-20	20-25	more th 25 minu
closest Bus stop	◯	◯	◯	◯	◯	◯
closest Train/Metro/Tram station	◯	◯	◯	◯	◯	◯

6

Is the **public transport** system of your city **reliable**? Rate from 1 to 6.

** Reliability in public transport means it consistently follows its schedule without causing noticeable delays for passengers.*

	1: not reliable at all	2	3	4	5	6: very reliable
Reliability	○	○	○	○	○	○

7

Please select the statement that **best describes** the transport system in your city.

- ○ My city's transport system is very multimodal, offering seamless integration of various transport modes like buses, trains, cycling, and walking.
- ○ The transport system in my city offers some multimodal options, but there is room for improvement in connecting them smoothly.
- ○ While there are different transportation modes available in my city, they operate more independently than in an integrated manner.
- ○ My city's transport system is not multimodal, primarily relying on singular or isolated modes of transportation.

8

Is the public transport system **inclusive to impaired and elderly people**? Rate the overall inclusiveness.

	1: not inclusive at all	2	3	4	5	6: very inclusive
Inclusivity	○	○	○	○	○	○

9

On a scale of 1 to 6, how would you rate the risk of experiencing crime or harassment while traveling? Please **assess** the **perceived personal safety** you feel per transport mode.

Please **assess** the **perceived personal safety** you feel per transport mode.

	1: not safe at all	2	3	4	5	6: very safe
Car	○	○	○	○	○	○
Taxi or ride-hailing	○	○	○	○	○	○
Public transport	○	○	○	○	○	○
Motorcycle	○	○	○	○	○	○
Bicycle, e-bike or e-scooter	○	○	○	○	○	○
Walking	○	○	○	○	○	○

10

On a scale of 1 to 6, how would you rate the risk of experiencing a traffic accident while traveling?

Please **assess** the **perceived road safety** you feel per transport mode.

	1: not safe at all	2	3	4	5	6: very safe
Car	○	○	○	○	○	○
Taxi or ride-hailing	○	○	○	○	○	○
Public transport	○	○	○	○	○	○
Motorcycle	○	○	○	○	○	○
Bicycle, e-bike and e-scooter	○	○	○	○	○	○
Walking	○	○	○	○	○	○

Social acceptance and shared mobility usage

11

Are the recent implemented transport policies/strategies in your city **acceptable** to you? Rate from 1 to 6. *

	1: not acceptable at all	2	3	4	5	6: fully acceptable
Acceptability	○	○	○	○	○	○

12

On a scale from 1 to 6, how **familiar** are you with the concept of shared mobility?
*Overall, how would you rate your **satisfaction** with the provided transport services in your city? Rate from 1 to 6*
*

	1: very unfamiliar	2	3	4	5	6: very familiar
Familiarity	○	○	○	○	○	○

13

Overall, how would you rate your **satisfaction** with the provided transport services in your city? Rate from 1 to 6

	1: very unsatisfied	2	3	4	5	6: very satisfied
Satisfaction	○	○	○	○	○	○

14

I can easily find the information I need to efficiently use the shared mobility modes available in my neighbourhood.
Please indicate your **level of agreement.** *

	1: strongly disagree	2	3	4	5	6: strongly agree
Agreement	○	○	○	○	○	○

Car-sharing services

Car-sharing is a mode of transportation that involves renting a car for a short period of time (one trip). It can be one-way carsharing, meaning that the user must return the car to the starting point, or free-floating carsharing, meaning that the user does not need to return the car to the starting point.

YOU CAN ADD THE LINK OF A PROJECT PARTNER (IF SO) WHO PROVIDES THIS SERVICE IN YOUR LIVING LAB AS AN EXAMPLE TO HELP THE RESPONDENTS

15

Have you ever used **car-sharing services** in your city? *

◯ Yes

◯ No

Please indicate your **level of agreement** with the following statements:

(user of car-sharing)

16

Using car-sharing services, It is difficult to transition to other transport modes

1: strongly disagree	2	3	4	5	6: strongly agree
◯	◯	◯	◯	◯	◯

17

Car-sharing allows me to reduce my total door-to-door travel time.

1: strongly disagree	2	3	4	5	6: strongly agree
◯	◯	◯	◯	◯	◯

18

I think my neighborhood's facilities allow me to safely use car-sharing services.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

19

Using car-sharing services, I can easily find an available vehicle.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

20

It is not easy to use a car-sharing service app..

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

21

I use a car-sharing service because my family/friends do as well.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

22

Using a car-sharing service is not pleasant.

	1: strongly disagree	2	3	4	5	6: strongly agree
	◯	◯	◯	◯	◯	◯

23

I intend to continue using car-sharing services in the future.

	1: strongly disagree	2	3	4	5	6: strongly agree
	◯	◯	◯	◯	◯	◯

Micro-mobility services

Micro-mobility services refer to small, often electric-powered transport options, like e-scooters, e-bikes, and shared bicycles that can be shared and rode by multiple users. They are primarily used for short-distance trips (first/last mile).

YOU CAN ADD THE LINK OF A PROJECT PARTNER (IF SO) WHO PROVIDES THIS SERVICE IN YOUR LIVING LAB AS AN EXAMPLE TO HELP THE RESPONDENTS.

24

Have you ever <u>used</u> **micro-mobility services** in your city?
*

◯ Yes

◯ No

Please indicate your **level of agreement** with the following statements:

(user of micro-mobility)

25

Using micro-mobility services, It is difficult to transition to other transport modes

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

26

Micro-mobility allows me to reduce my total door-to-door travel time.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

27

I think my neighborhood's facilities allow me to safely use micro-mobility services.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

28

Using micro-mobility services, I can easily find an available vehicle.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

29

It is not easy to use a micro-mobility service app..

	1: strongly disagree	2	3	4	5	6: strongly agree
	◯	◯	◯	◯	◯	◯

30

I use a micro-mobility service because my family/friends do as well.

	1: strongly disagree	2	3	4	5	6: strongly agree
	◯	◯	◯	◯	◯	◯

31

Using a micro-mobility service is not pleasant.

	1: strongly disagree	2	3	4	5	6: strongly agree
	◯	◯	◯	◯	◯	◯

32

I intend to continue using micro-mobility services in the future.

	1: strongly disagree	2	3	4	5	6: strongly agree
	◯	◯	◯	◯	◯	◯

Please indicate your **level of agreement** with the following statements:

(potential user of ride-hailing or shuttle)

50

I think if I tried ride-hailing or shuttle, it might be difficult to transition to other transport modes.

	1: strongly disagree	2	3	4	5	6: strongly agree
	○	○	○	○	○	○

51

I think ride-hailing or shuttle would allow me to reduce my total door-to-door travel time.

	1: strongly disagree	2	3	4	5	6: strongly agree
	○	○	○	○	○	○

52

I think my neighborhood's facilities would allow me to safely use ride-hailing or shuttle services.

	1: strongly disagree	2	3	4	5	6: strongly agree
	○	○	○	○	○	○

53

I think if I used ride-hailing or shuttle services, I would easily find a vehicle to use.

	1: strongly disagree	2	3	4	5	6: strongly agree
	○	○	○	○	○	○

54

I think using a ride-hailing or shuttle service app might not be easy.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

55

If my family/friends use a ride-hailing or shuttle service, I might try it too.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

56

I think using a ride-hailing or shuttle service would not be pleasant.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

57

I intend to continue using ride-hailing or shuttle services in the future.

1: strongly disagree	2	3	4	5	6: strongly agree
○	○	○	○	○	○

Present travel behavior

In the next section of the questionnaire, you are asked to describe the **trips** you made just **yesterday**.

The **maximum number** of trips you can describe is **5**.

In all cases, you will not be asked to provide the exact location of the starting and ending points and the exact time of each movement.

Please consider that you **start** from your **home location**.

58

Firstly, **how many vehicles** do you have in your household?

	0	1	2	3+
convetional car (diesel, gazoline or hybrid)	○	○	○	○
electric car	○	○	○	○
truck, bus, van	○	○	○	○
motorcycle	○	○	○	○
bicycle or e-bike	○	○	○	○
e-scooter	○	○	○	○

Trip 1

59

1. Indicate the **origin** of your first trip (where did you start traveling?)

*

Επιλέξτε την απάντησή σας

60

1. Indicate the **destination** of your first trip (where did you go?)

*

Επιλέξτε την απάντησή σας

61

1. Which **transport mode** did you choose to reach your destination? Please select the main transport mode of your trip.
*

Επιλέξτε την απάντησή σας

0: Walking
1: Private car
2: Taxi
3: Metro, tram, suburban railway etc.
4: Bus
5: Private bicycle (or e-bike)
6: Motrorcycle
7: Private e-scooter

62

1. Note the **purpose** of your trip:

Επιλέξτε την απάντησή σας

63

1. During which **time period** did this movement take place?

Επιλέξτε την απάντησή σας

64

Did you take another trip within the same day?
*

Yes

No

Socio-demographic characteristics

65

Gender:

- ◯ Male
- ◯ Female
- ◯ Prefer not to say

66

Age group: *

- ◯ 18-30 years old
- ◯ 31-40 years old
- ◯ 41-50 years old
- ◯ 51-65 years old
- ◯ Older than 65
- ◯ Prefer not to say

67

Education level:

- ◯ Primary school
- ◯ Secondary or high school
- ◯ Bachelor
- ◯ Master or PhD
- ◯ No education
- ◯ Prefer not to say

68

Employment status:

- Housekeeper, maid, etc.
- Student
- Unemployed
- Freelancer or Entrepreneur
- Retiree
- Public or private sector employee
- Caretaker, craftsman, construction or factory worker, etc.
- Farmer
- Prefer not to say

69

How would you evaluate your monthly (individual) **income level** compared to the national average?

	1: significantly below the average	2	3	4	5	6: significantly above the average
Income	○	○	○	○	○	○

70

Do you have any **physical disabilities** or conditions that affect your ability to move?

- Yes
- No
- Prefer not to say