Interreg Baltic Sea Region

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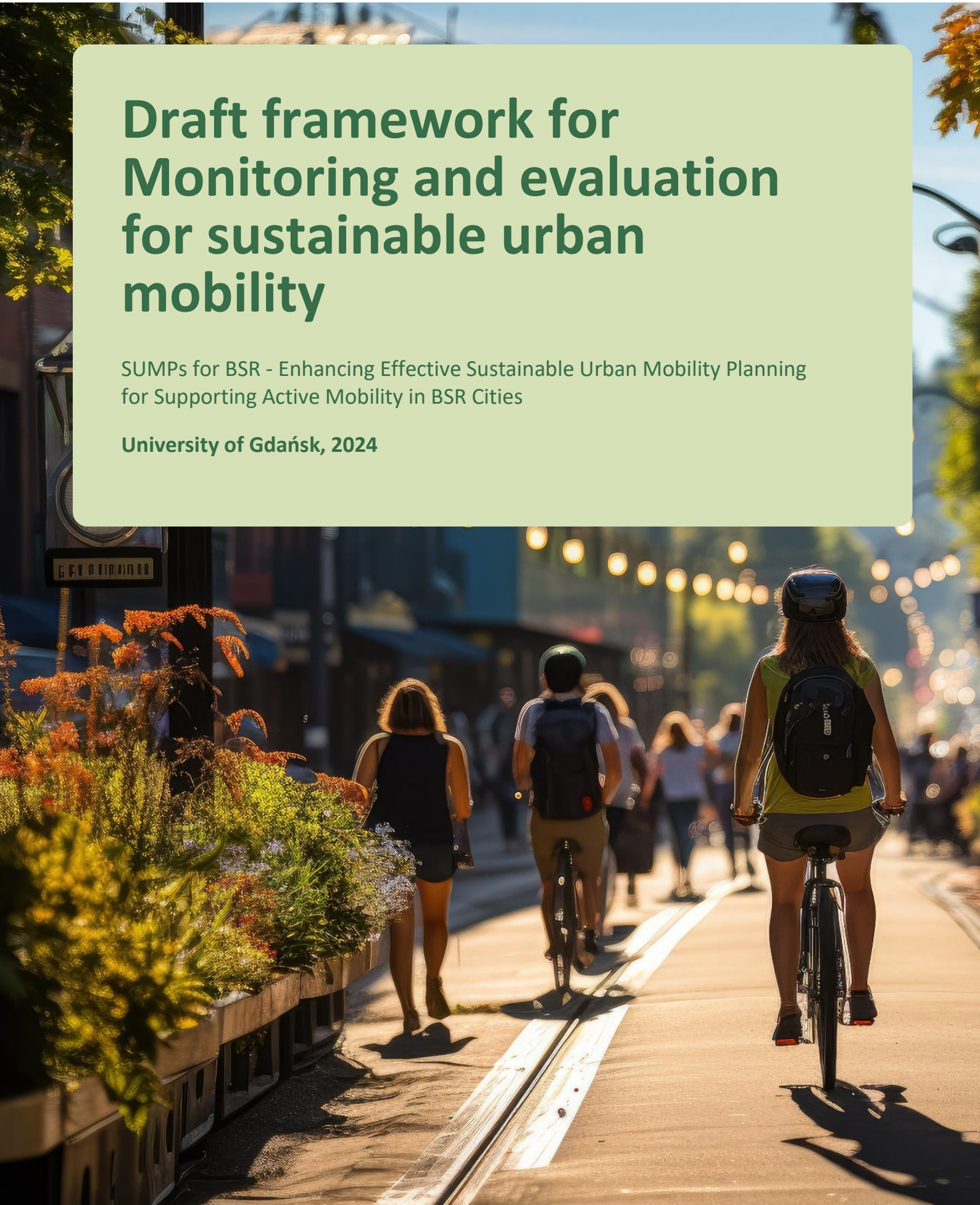
SMART GREEN MOBILITY
SUMPs for BSR

Draft framework for Monitoring and evaluation for sustainable urban mobility

SUMPs for BSR - Enhancing Effective Sustainable Urban Mobility Planning for Supporting Active Mobility in BSR Cities

University of Gdańsk, 2024



Imprint

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Project note

SUMPs for BSR project supports cities shifting their planning practices towards people-centered sustainable urban mobility planning focusing on active mobility modes to fight the climate crisis. The project aims to increase the uptake of Sustainable Urban Mobility Plans (SUMP) as a strategic tool for sustainable mobility planning by developing tools and offering extensive capacity building for local authorities, especially in small and mid-sized BSR cities. A common framework for monitoring and evaluation for sustainable urban mobility planning will be developed to set up sound local processes suitable to smaller cities. Together with a unified model for testing and experimenting with innovative mobility solutions, it will help to evaluate the performance of the local mobility system and provide crucial information for planning and decision making.

Content

1. Introduction

1.1. About the SUMPs for BSR project

The SUMPs for BSR project aims to increase the uptake of Sustainable Urban Mobility Plans (SUMPs) as a strategic tool for sustainable mobility planning for local authorities, especially in small and medium-sized Baltic Sea Region (BSR) cities. The project focuses on 3 key topics: the harmonisation of monitoring and evaluation approaches across borders, the recognition of active modes as key components of local mobility systems and the uptake of small-scale experiments as a strategic tool to promote active mobility. These topics have been identified as challenging for the cities in the need assessment done in the preceding seed money project and during the SUMPs for BSR project, both supported by the Interreg Baltic Sea Region Programme.

One of the key outputs of the SUMPs for BSR project is a common framework for monitoring and evaluation of sustainable urban mobility supporting cities in the region to set up sound local monitoring and evaluation processes. It will help to evaluate the performance of the local mobility system and to provide crucial information for planning and decision-making. In addition to testing and validating the framework, partner cities are doing local evaluation and data collection pilots where they are testing new ways to collect data on active mobility. The experiences of partner cities will help to finetune the framework for cities of different sizes, resources and levels of knowledge within the monitoring and evaluation framework, and also, be compiled into case studies for other cities for self-study.

1.2. Sustainable Urban Mobility Planning – policies and practice

1.2.1. Development of Sustainable Urban Mobility Policies

A sustainable approach to urban mobility and transport planning has become increasingly popular in EU countries over the years. In 2007, it gained support from the European Commission, which proposed the Green Paper titled "Towards a New Culture for Urban Mobility" (European Commission 2007). In 2009, the European Commission followed this by presenting an action plan for urban mobility. Since then, the Commission has continuously encouraged the authorities of EU member states to take action in this area. An official communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions, dated December 17, 2013, called for increased support for European cities in undertaking transport initiatives to more effectively implement EU policy on competitive and resource-efficient mobility. One of the appendices to the communication focused on the Sustainable Urban Mobility Plans (SUMPs) actively promoted by the European Commission, providing guidelines on how these plans should be developed. (European Commission, 2009; Rupprecht Consult, 2019; Wolek, 2016)

In December 2019, the European Commission introduced the Green Deal, a legislative package aimed at adapting the EU's climate, energy, transport, and taxation policies to achieve the goal of reducing net greenhouse gas emissions by at least 55 percent (%) by 2030, compared to 1990 levels. It also aimed for a 90 percent (%) reduction in transport sector emissions by 2050 to achieve climate neutrality. (European Commission, 2019 & 2021b)

The Sustainable and Smart Mobility Strategy was adopted in December 2020 (European Commission, 2020). It is based on three key objectives (Towards zero emission road transport, 2020):

- sustainable mobility, aiming for an irreversible shift to zero-emission mobility by making all transport modes more sustainable, ensuring wide availability of the most sustainable options, and providing users with incentives to make sustainable choices.
- smart mobility, supporting sustainable choices through digitalisation and automation to achieve seamless, safe, and efficient connectivity.
- resilient mobility, recovering from the COVID-19 pandemic by creating a Single European Transport Area that is affordable and accessible for all citizens and businesses and resilient against future crises and safety challenges.

The strategy also stipulates that "all large and medium-sized cities that are urban nodes on the TEN-T network put in place their own sustainable urban mobility plans by 2030". Other significant provisions for urban mobility include the internalisation of external transport costs by 2050, ensuring that transport users bear the full costs instead of leaving them to society, achieving at least 100 climate-neutral cities in Europe, mass electrification of private cars, integrating electronic ticketing to facilitate seamless multimodal passenger transport, making mobility affordable and accessible in all regions, and unleashing the full potential of data. (European Commission 2021a)

Since the release of the Sustainable and Smart Mobility Strategy, in late 2023 the European Commission has revised the regulation for the Trans-European Transport Network (TEN-T). The updated regulation strengthens the urban layer of the TEN-T policy and makes it obligatory for the cities listed as urban nodes to establish a SUMP by 2027. This new requirement will concern a large number of cities, as the number of urban nodes has increased to include over 400 urban nodes. In addition, the revised regulation will make it obligatory for the urban nodes to collect and submit relevant urban mobility data to the European Commission. The subsequent implementing act will set out the list of sustainable urban mobility indicators and their calculation methodology. (European Commission 2023a, European Commission 2024)

1.2.2. Sustainable Urban Mobility Planning – shifting focus from transport to people

One of the reasons for ensuring sustainable urban mobility is the fact that the transport sector is responsible for about 25 percent (%) of global emissions (European Commission, 2021b). The growing significance and size of urban areas mean that the negative environmental impacts are concentrated in small areas, affecting an increasing number of residents. Mobility systems, together with the built environment, are the leading drivers of rising demand for resource consumption, followed by food and energy systems. The Global Resources Outlook 2024, suggests that enabling mobility through shared and active transport could reduce greenhouse gas emissions by 60 percent (%) by 2060 compared to current trends. (United Nations Environment Programme, 2024, p. XV)

The European Commission has been actively supporting sustainable urban mobility planning (SUMP) over the last decade, as an effective tool for planning and implementing sustainable transport policy. According to the SUMP Guidelines, the Sustainable Urban Mobility Plan is defined as follows: "*A Sustainable Urban Mobility Plan is a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due*

consideration of integration, participation, and evaluation principles." (Rupprecht Consult (eds.), 2019, p. 9)

The SUMP concept is based on eight core principles, including planning for the functional urban area, cooperation across institutional boundaries, involvement of citizens and stakeholders, a thorough assessment of the current situation and future trends, the definition of a widely supported common vision with strategic objectives, an integrated set of different measures to deliver the objectives, accompanied by systematic monitoring and evaluation processes (Rupprecht Consult (eds.), 2019). The most important differences between traditional and sustainable approaches to transport planning are shown in Table 1. The sustainable approach to transport and mobility planning significantly expands on the traditional approach in all key areas.

Table 1 Differences Between Traditional and Sustainable Approaches to Transport Planning (Rupprecht Consult (eds.), 2019)

Traditional Approach to Transport Planning	**Sustainable Approach to Transport Planning**
Focus on traffic	Focus on **people**
Primary objectives: Traffic flow capacity and speed	Primary objectives: **Accessibility** and **quality of life**, including social equity, health and environmental quality, and economic viability
Mode-focussed	**Integrated development of all transport modes** and shift towards sustainable mobility
Infrastructure as the main topic	**Combination** of infrastructure, market, regulation, information and promotion
Sectoral planning document	Planning document **consistent with related policy areas**
Short and medium-term delivery plan	Short and medium-term delivery plan embedded in a **long-term vision and strategy**
Covering an administrative area	Covering a **functional urban area** based on travel-to-work flows
Domain of traffic engineers	**Interdisciplinary** planning teams
Planning by experts	Planning with the **involvement of stakeholders and citizens** using a transparent and participatory approach
Limited impact assessment	Systematic **evaluation** of impacts to facilitate learning and improvement

Sustainable Urban Mobility Planning (SUMP) approach has shifted the focus of local transport policies from car infrastructure-oriented planning to mobility development and further to the quality of life, health, resilience and circular economy, while over time aiming to cut down the increasing car dependency. This progress is described in Figure 1. Currently, due to both the new and pre-existing unresolved challenges faced by cities, such as those arising from climate change, the concept of SUMP is evolving into a new phase. As a result, SUMP increasingly addresses issues related to the circular economy and urban resilience. The integration of the circularity process into SUMP in cities aims to reduce and eventually eliminate the generation of unused waste and by-products within transport systems. The goal is to efficiently reintegrate these materials into the cycle, potentially in different roles. This concept is highly complex in terms of potential solutions, which are commonly grouped according to the "10 R" framework: Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, and Recover. Its complexity in relation to transport systems arises also from its applicability to all aspects of

transportation, including vehicles and their components, transport infrastructure, energy sources, and more. By encompassing these various dimensions, the circularity process addresses the full lifecycle of materials, promoting sustainability across the entire transport ecosystem. Moreover, incorporating urban resilience into SUMP is intended to enhance the capacity of urban transport systems to adapt to changes, increase their resistance to disruptive events, such as natural disasters, crises, or socio-economic challenges, and improve their ability to recover and return to their pre-event state (Figure 1). It is important to emphasise that the subsequent stages of SUMP development do not undermine the validity of the analyses, monitoring, or actions undertaken in earlier phases. Rather, they build upon these stages, aiming to further refine SUMPs to more effectively address the current challenges faced by urban areas.

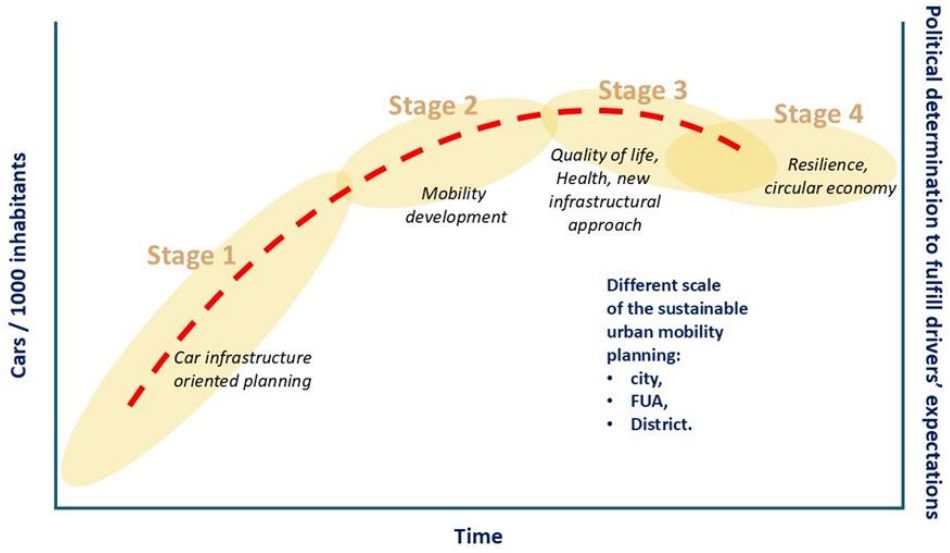

Figure 1 Stages of Sustainable Urban Mobility Planning (Self-study based on Wefering, F. et al., 2013; Wołek, M., 2019)

1.2.3. Sustainable Urban Mobility Planning on different levels

Sustainable urban mobility planning most often applies to the city level, but increasingly, as recommended in the SUMP Guidelines, to the Functional Urban Area (FUA) level (in reference to Figure 1). Sometimes the SUMP approach is applied for smaller units, such as specific districts, or central areas of cities (Wołek, Gromadzki, Jagiełło, 2021). These central areas experience a large scale of commuting for various purposes and tend to reveal the multiplied problems related to the division of urban space, environmental pollution, noise, and other issues. The multilevel approach is applied for example in the City of Gdynia, Poland. In addition to the City-level SUMP, the Metropolitan-level SUMP covers 59 municipalities in the area of Gdansk-Gdynia-Sopot. The district-level SUMP covers a distinct district of Chwarzno-Wiczlino within the City of Gdynia, Poland (Figure 2).

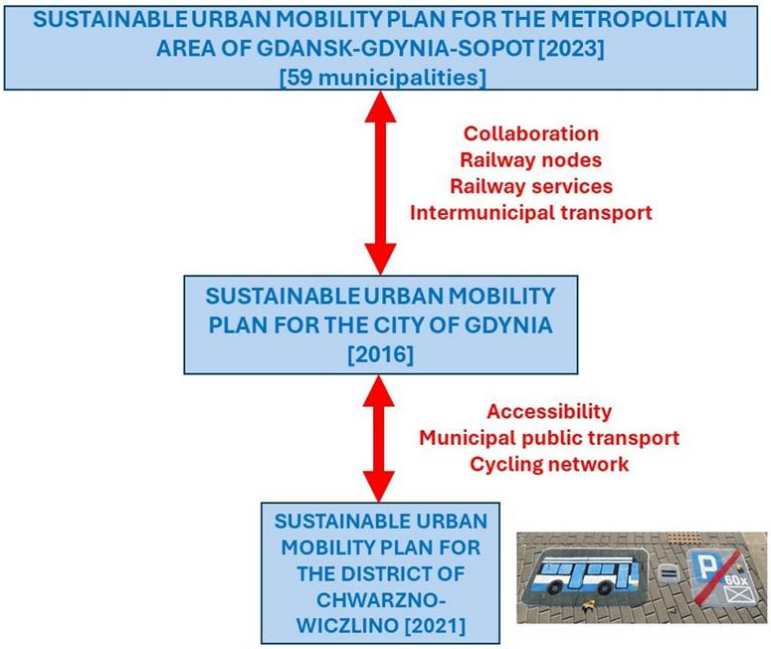

Figure 2 An example of SUMPs on three-level in the City of Gdynia, Poland, based on self-study

Almost half (43 %) of the EU population resides in small urban areas with a population of between 5000 and 50000 inhabitants, and two-thirds (66 %) of the population in areas with fewer than 500000 inhabitants (European Commission 2023b). The population of the Baltic Sea Region (BSR) accounts for 106 million people, representing a quarter (24 %) of the EU population in 2020. However, it is distributed unevenly with most of the population concentrated in Northern Germany, Poland, and Denmark, while the rest of the BSR is scarcely populated. Based on OECD statistics, there are 135 Functional Urban Areas (FUAs) in the Baltic Sea Region, representing 63 percent (%) of its total population. The urban landscape in BSR is shaped by the smaller and medium-sized cities, which play a key role in creating spatial and social cohesion. Their role is particularly significant in areas with low population density, where they serve as important centres for socio-economic development. (VASAB 2022, p.21-22)

Many EU-funded initiatives, e.g. CIVITAS SUITS project (2021) and the SUMPs for BSR project (2023) behind this draft framework, emphasize the importance of considering the specific needs of small and medium-sized cities in Sustainable Urban Mobility Plans (SUMPs). These projects address existing gaps in the capacity of these cities to support sustainable mobility in both policymaking and transport planning, with the aim of improving the overall quality of urban life.

1.2.4. Stakeholder involvement in Sustainable Urban Mobility Planning

Philosophy signifies the presence of fundamental issues for planning sustainable development in the most important strategic documents of the city. If a democratically elected body adopts these documents, it confirms the strategic direction of development based on the principles of sustainable development. A good example of this is the well-defined process of working towards climate neutrality in the City of Turku, Finland. To achieve climate neutrality by 2029, the city has developed specific action plans for various sectors of its operations, accompanied by indicators to track the progress of their implementation.

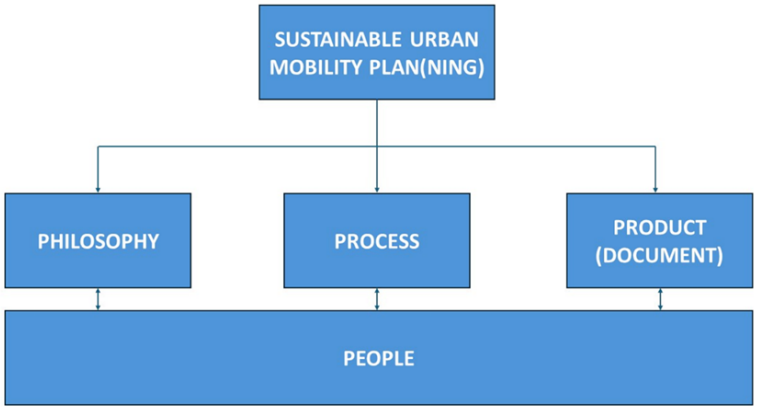

Figure 3 The broader context of sustainable urban mobility planning, based on self-study

Sustainable urban mobility planning assumes a high level of public engagement in the process. This means that, depending on the size of the city, its characteristics, and the scope of the document, various groups of stakeholders should be involved in its development. Referring to Jan Gehl's book *Cities for People* (2010), the design trends in the urban space overlooked the scale of individual persons for years. Restoring this focus means concentrating on people as the most important "users" of the city. Therefore, sustainable urban mobility planning takes people and their needs as its starting point (Figure 3). To properly define and address these needs, it is necessary to identify stakeholders important for sustainable urban mobility planning.

Figure 4 presents an example of a stakeholder segmentation scheme for a medium-sized city. The structure of selected stakeholders for mobility planning results from the local context. Typically, stakeholders should represent all areas of the city's functioning. Using their relationship with local government as a criterion, they can be roughly divided into "internal" and "external" stakeholders. The first category includes employees of the city administration, particularly those working in departments responsible for spatial planning, transport and mobility, economic development, social affairs, and education. In the Baltic Sea Region, many cities have a well-developed port and maritime sector, which has a multifaceted impact on the city's functioning. Therefore, it is necessary to consider specific stakeholders, such as port authorities, representatives of the logistics sector, and the shipbuilding industry.

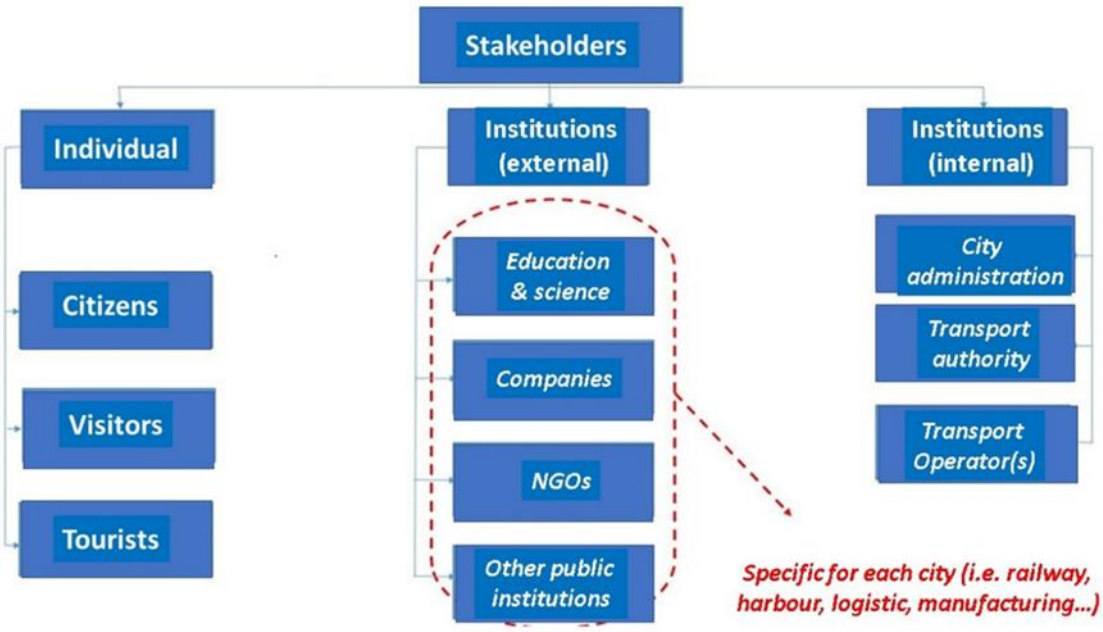

Figure 4 An exemplary segmentation of stakeholders necessary for the sustainable urban mobility planning process based on: A handbook for Preparation of Sustainable Urban Mobility Plans, ed. Wołek 2016

It is also essential to develop a communication scheme with individual stakeholders, considering local specifics and the potential for effective communication (e.g., the limited usefulness of digital tools when engaging with older individuals). As a result, a list of stakeholders relevant to the issues mentioned above should be created, specifying who will be involved at different stages of the planning process.

A particular challenge is selecting individual stakeholders, who are typically the city's residents. The most reliable way to consult with them is through market research, provided that the sample is appropriately selected to ensure representativeness of all resident groups, for example, based on gender, age, or place of residence.

1.2.5. Monitoring and Evaluation for Sustainable Urban Mobility Planning

Monitoring in relation to urban mobility planning and management can be defined as a systematic process of collecting, processing, analysing, and interpreting all data concerning, both the ways and the conditions in which the urban transport system functions. The aim of this process is to assess the quality of the policies, strategies, and actions implemented so far and to support informed decision-making for further optimisation of urban mobility.

Evaluation concerning urban mobility planning and management can be defined as a systematic process of assessing and analysing the efficiency, effectiveness, and impacts of the policies, strategies, and actions implemented within urban mobility management. The evaluation examines also the underlying causes of changes observed in the monitoring process (Rye, 2017, p.3). According to this perspective, evaluation should facilitate explaining why the change in a particular indicator within the monitoring system occurred, reached a specific value, and proceeded in a certain direction. The goal is to provide feedback and recommendations to decision-makers responsible for implementing the ideas of sustainable urban development.

These two elements, monitoring and evaluation, are closely interconnected and create a synergistic process supporting effective planning and management of urban mobility. The monitoring framework thus provides the necessary data for conducting evaluation, and the results of the evaluation inform about the need to modify and improve both the policies, strategies, and actions related to sustainable mobility, as well as the monitoring framework itself.

Therefore, the monitoring and evaluation framework should perform many functions in the process of urban mobility management. Its most important tasks include:

- Acquiring, collecting, and updating existing data;
- Identifying the directions and scales of ongoing changes or trends;
- Monitoring and assessing the effectiveness of implemented actions, strategies, and policies;
- Supporting decision-making processes in situations where there are doubts regarding the necessity, urgency, and significance of specific actions;
- Early detection of problems, enabling quick corrective or remedial actions;
- Detecting particularly effective actions for potential replication;
- Ensuring consistency of actions related to urban mobility with those undertaken in other areas, such as environmental protection or urban spatial planning;
- Providing the possibility of concrete and consistent communication with all stakeholders, especially residents and enterprises operating within the city.

The main objective of monitoring and evaluating in SUMPs, is to ensure the effectiveness, efficiency, and long-term viability of implemented urban mobility policies, as well as to track progress toward achieving the sustainable development targets. These objectives should be tailored to the current state of a city's transportation system, the conditions of urban mobility, and the scale of associated challenges.

The scope of monitoring and evaluation conducted for sustainable urban mobility management depends on the size of the city as well as its functional area. This is because larger cities and their functional urban areas are characterised by, among other factors, more complex transport systems, a greater number of stakeholders, a more extensive range of transport services, and more diverse mobility patterns among residents. This mean that larger cities require the use of more advanced analytical tools and a greater number of complex indicators to effectively assess the impact of implemented measures on sustainable development and the efficiency of the transport system. In larger cities, conducting a comprehensive diagnosis of the current situation also requires the acquisition of a larger volume of data and information. These should cover a wider range of variables and originate from a greater variety of sources.

In contrast, in small cities, transport planning focuses on simpler systems and local issues, with changes being more easily implemented. Active mobility like walking and cycling are common, but parking issues and traffic reduction are less frequent and on a smaller scale. Integration with regional transport and access to modern technologies are limited, due to smaller budgets and fewer resources. Public participation is more personal, reflecting close-knit communities and climate actions are often basic, focusing on emission reduction through the actions like promoting active mobility.

1.3. Summary of the baseline analysis and literature review

1.3.1. Review of documents & guidelines on monitoring and evaluation in SUMP

In the SUMPs for BSR project, the development of the common framework for monitoring and evaluation for sustainable urban mobility planning started by reviewing the work done by previous initiatives, such as the CH4LLENGE project, SUMI project and SUMPs-UP that have worked with different aspects of the monitoring and evaluation. Selected outcomes of previous projects and initiatives, that were directly or indirectly dedicated to monitoring and evaluation processes and their role in the effective development of SUMP plans, have been utilised in the development of this framework (list in Appendix 1). The individual studies, concepts, and ideas regarding the creation of monitoring and evaluation systems within the SUMP framework should be seen as complementary rather than substitutive. Each of these approaches contributes unique insights and ideas that, when integrated, provide a more comprehensive and robust framework for the effective implementation of SUMPs.

A review of the documents and project reports published to date on monitoring and evaluation as components of SUMPs allows for the formulation of the following general conclusions:

- Although general guidelines exist, such as those developed by the European Commission and the ELTIS platform, there is still no consensus on the areas of urban mobility that must be covered by monitoring and evaluation frameworks.
- Despite the existence of indicator sets proposed by various organizations and projects (e.g., CIVITAS, SUMI), a universal and widely accepted set of indicators to be used in monitoring and evaluation frameworks has yet to be developed.
- There remains a lack of consensus on the optimal frequency and intervals for conducting measurements within the functioning of monitoring and evaluation frameworks.
- Although initiatives like " SUMP Guide for Smaller Cities and Towns " highlight the need for individualized approaches, little attention has been devoted in discussions to the differentiation of monitoring and evaluation frameworks among cities of different sizes.
- Despite numerous initiatives, consistent and uniform methodologies for conducting measurements within monitoring and evaluation have not yet been developed, even for such key indicators as modal split.
- It is emphasised that an efficient monitoring and evaluation process requires high-quality data, access to which is currently not always possible. The situation varies not only among cities of different sizes but also between individual EU countries, including those in the Baltic Sea region.

1.3.2. Baseline analysis

The next step in the SUMPs for BSR project, led by the University of Gdansk, was to carry out a baseline analysis on the partner cities' local Monitoring and Evaluation (M&E) frameworks and a data audit to identify the gaps and challenges, especially in small and medium-sized cities in the Baltic Sea Region. The process, described in Figure 5, included a questionnaire establishing the base for gathering data and information on the actions and solutions for M&E implemented by the partner cities, individual in-depth interviews with key specialists on the topic, a review of the SUMPs or related documents of the partner

cities, several workshops with project partner cities to continuously develop the framework and input collection from the external cities and national level representatives through the project's Cross-Border Advisory Group and a Sustainable Urban Mobility Indicator workshop.

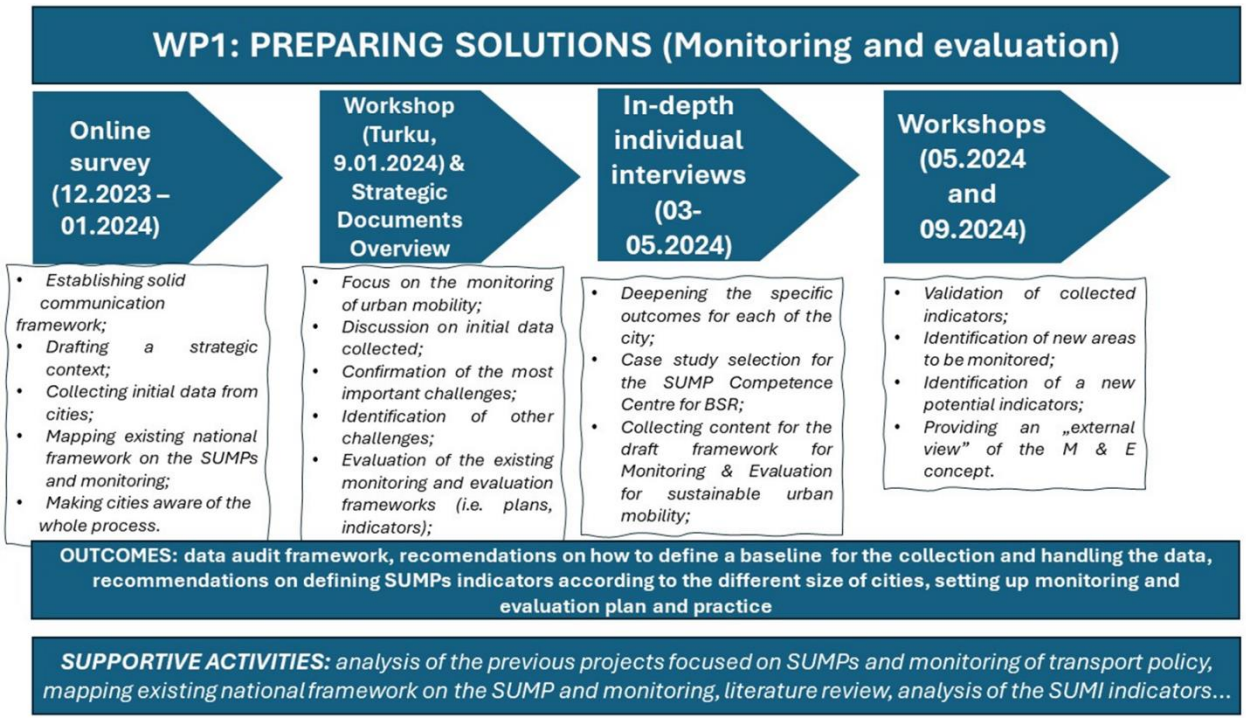

Figure 5 The baseline analysis process for developing the Monitoring and Evaluation framework

A key part of this process was the in-depth interviews conducted with representatives from all partner cities in the SUMPs for BSR project. During the interviews, the focus was primarily on obtaining knowledge regarding:

- The division of responsibility for data collection, integration, and archiving among different units within local government offices,
- Which indicators previously used have proven to be particularly useful, and which have been ineffective in the actual management of urban mobility,
- How key indicators for the urban mobility system, such as modal split, are measured,
- What technological, legal, or other constraints the partners encounter while monitoring urban mobility,
- Which social groups are specifically monitored, and which have not been sufficiently covered in terms of monitoring their mobility behaviours and preferences,
- How much influence does the data have on actual actions and decisions made in the management of the urban mobility system,
- To what extent are modern tools and technologies used to monitor transport behaviours and preferences?

The interviews emphasised the need to review the documents, such as SUMPs, transport plans, and other strategies (listed in Appendix 2), used in sustainable urban mobility management. The review included an analysis of the thematic areas covered by these documents in each city, as well as the methods and solutions employed during their development for monitoring and evaluating urban mobility systems in the

respective cities. A summary of the covered topics is presented in Table 2. It shows that none of the partner cities has, in their previous documents, addressed all of the key thematic areas comprehensively. Notably, certain areas have been poorly covered in the documents, such as circular economy, emissions & air quality, reduction of traffic jams and travel time, shared mobility, and land use and spatial planning. On the other hand, areas, such as walking, cycling, car traffic, and parking policy are particularly well covered in the existing SUMPs and related documents, such as urban development strategies.

Table 2 Thematic areas covered in the baseline analysis of the SUMP or SUMP-related documents

	The diagnostic part (refers to the current state)						Strategic part (refers to the future)					
Thematic area	**Gävle**	**Greifswald**	**Gdynia**	**Cesis**	**Turku**	**Panevezys**	**Gävle**	**Greifswald**	**Gdynia**	**Cesis**	**Turku**	**Panevezys**
Walking	X	X	X	X	X	X	X	X	X	X	X	X
Cycling	X	X	X	X	X	X	X	X	X	X	X	X
Public transport	X		X		X	X	X		X		X	X
Parking policy	X	X	X			X	X	X	X		X	X
Car traffic		X	X	X	X	X	X	X	X	X	X	X
Urban deliveries and urban logistics		X	X				X		X		X	X
Traffic safety	X		X	X	X	X	X		X	X	X	X
Integration of transportation means	X		X				X		X		X	X
Shared Mobility		X					X	X			X	X
Reduction of Traffic Jams and Travel Time			X			X			X		X	X
Accessibility		X	X				X	X	X			X
Emissions & air quality					X		X		X		X	X
Heavy freight traffic	X		X		X		X		X		X	
Health and quality of life	X	X			X		X	X	X	X	X	X
Integration nodes			X		X	X	X		X	X	X	X
Land use and spatial planning	X				X		X			X	X	
Circular economy										X		X

Additionally, the review of the previously applied methods for monitoring urban mobility in SUMPs and related documents in the partner cities of the SUMPs for BSR project revealed several trends regarding the thematic areas addressed. Specifically, the strategic sections of the documents, those concerning future plans, tend to cover more thematic areas than the diagnostic sections, which focus on the present and existing conditions. Another observed pattern is that larger cities tend to implement a more comprehensive and sophisticated approach to monitoring and evaluation. This trend is evident both in the number of indicators used and in the range of thematic areas covered by those indicators.

Based on the review documents, it was found that some of the problems associated with the current functioning of urban transport systems are common across all partner cities, such as the excessive role of private cars in the modal split or insufficient financial resources to develop public transport to a

satisfactory level. Some problems related to the current functioning of urban transport systems are unique to specific partner cities, stemming from distinctive conditions, such as geographic factors, steep terrain, or the presence of a large seaport in the central area of the city. Since unique problems require unique solutions and actions, they may also necessitate exceptional elements within the M&E framework to monitor changes related to these specific issues. Differences in the indicators and data collection methods used set limits to the comparability of results between individual cities, as well as within national or European statistics. It needs to be taken into account that there are discrepancies in the quantity and level of detail of the documents in the possession of partner cities of the project.

2. Draft framework for Monitoring and evaluation for SUMP

2.1. The scope of monitoring and evaluation framework

The local monitoring and evaluation framework should address all key areas of the urban mobility system's functioning. It should therefore enable the assessment of the current situation in the following areas:

- The level of utilisation of different travel methods and their associated consequences (e.g., congestion);
- The level of development of subsystems, particularly the infrastructure supporting various modes of transportation;
- The impact of the urban mobility system on residents' health (including traffic accidents);
- The impact of the urban mobility system on the state of the natural environment;
- The current prioritisation of specific travel modes within the transport system.

These areas apply to all elements of the urban mobility system, namely:

- Pedestrian travel;
- Bicycle and micromobility travel;
- Public transport;
- Private cars;
- Shared mobility;
- Urban logistics;
- Heavy freight transport.

With regard to these areas, the M&E framework should enable the determination of the current conditions under which the urban mobility operates, i.e., the conditions experienced by residents prior to the implementation of the SUMP.

The M&E framework developed as part of the SUMP should help establish a set of clear and achievable goals across different time frames (ranging from short-term, one-year goals to long-term, e.g., 10-year goals). The articulation of these goals should be precise and linked to the formulation of indicators, allowing for the continuous assessment of the extent and direction of changes in each area. Therefore, the M&E framework serves both to define the current situation of a given urban mobility system and to monitor the changes occurring within it in the future.

Specific actions should be assigned to each goal, with their implementation enabling the achievement of the respective objective. Each goal should be clearly and precisely assigned to specific entities responsible for implementing and coordinating the actions taken to achieve the goals as well as for monitoring and evaluating the changes that occur. Depending on the time horizon of the given goal, the time interval for measuring the magnitude of changes in the corresponding indicators should be specified. Thus, it is necessary to identify which indicator values within the M&E framework will be measured at quarterly, annual, or longer intervals (e.g., every three years).

Figure 6 presents a schematic representation of the key areas that should be covered by the M&E framework. It highlights that a comprehensive understanding of the functioning of the urban mobility system, including transport preferences and behaviours, requires data and information not only related to urban mobility itself but also concerning urban space and land use. This is due to the fact that urban space and its management directly affect the availability of transport infrastructure, residents' choices of transportation modes, and travel patterns. Changes in the urban layout, such as population density and the location of residential, commercial, and service areas, can either increase or decrease the demand for transport as well as influence the efficiency of different modes of travel.

This implies that alterations in urban space, just as in the transport subsystems themselves, can lead to both desired changes in the modal split of urban travel as well as unintended, undesirable ones. Given that the transport system of a city and the way urban space is managed can either support or hinder the progress toward more sustainable urban mobility, the M&E framework must assess, diagnose, and measure the scale of both conflict areas and areas of cooperation between these two domains. Addressing both the city's transport system and urban space should also enable the identification and description of best, good, and poor practices.

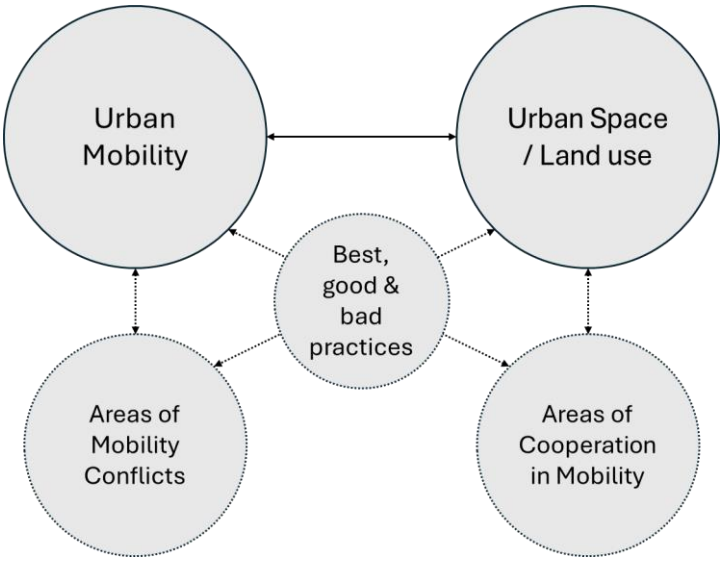

Figure 6 Main areas of Monitoring and Evaluation

2.2. Steps for developing the local monitoring and evaluation plan

The monitoring and evaluation framework possesses a dual nature. On one hand, the indicators used within this framework should directly relate to the goals and actions undertaken to achieve them. This approach prevents conducting "measurements for the sake of measurements." On the other hand, the monitoring and evaluation framework should enable a comprehensive diagnosis of the conditions and state of urban mobility in a given city. This means that the implemented indicator system should allow for the identification of problematic areas, both geographical and thematic, even before actions are taken to improve them.

In summary, the set of indicators used in the monitoring and evaluation framework, along with the data collected, should enable both the monitoring of the urban mobility system itself and the assessment of the effectiveness and efficiency of the actions taken. Therefore, this framework should have both a

passive character, focused on continuous monitoring of all key areas of urban mobility, and a reactive character, aimed at conducting precise measurements related to the assessment of actions implemented within the management of the urban mobility system and urban space.

This relationship is well illustrated in the process of developing a M&E framework presented below in Table 3. It shows that data and the indicators calculated from them are essential both in the initial stages related to formulating goals and actions, as well as in the later stages concerning monitoring the effectiveness and efficiency of these strategies and actions. In light of the abovementioned, when referring to monitoring and evaluation, it seems appropriate to use the term "cycle" rather than "process," as the former indicates that, when data becomes outdated, its collection and gathering should commence anew.

The steps of developing a monitoring and evaluation framework for managing sustainable urban mobility are inextricably linked with the process of managing sustainable urban mobility itself. The stages related to monitoring and evaluation can be presented and integrated into the sustainable urban mobility management process, as described in more detail in Table 3. The key conclusions derived from the table can be summarized as follows:

- The planning process within the work on SUMP should begin with an in-depth analysis of existing plans that are contained in current strategic documents.
- Primary data should be collected only in cases where adequate secondary data sources are unavailable.
- Particular attention should be given to areas identified as "data gaps" within the database—those aspects of mobility that have not yet been monitored or analyzed.
- In evaluating key areas of urban mobility, it is recommended to review the completeness and sufficiency of data both at the stage of diagnosing the current state and after setting future plans, actions, and objectives.
- The monitoring system should provide sufficient information to enable adjustments in plans, actions, and goals related to the urban mobility strategy.
- If issues in the monitoring system are detected, such as the inability to calculate specific KPIs, the underlying causes should be identified promptly, and appropriate corrective measures should be taken. This may involve adjusting data collection methods, supplementing missing data sources, or modifying the KPIs themselves to better align with available data resources.

Table 3 Recommended steps in developing the M&E framework

Step	Description	Exemplary useful questions
Review of existing strategic documents important for sustainable urban mobility planning.	A review of existing strategic documents that allow for directing actions and the monitoring system. At this stage, linking the mobility plan (or a similar document) with the city's strategic documents or those at a higher level is possible.	What thematic areas are covered by the monitoring in the existing mobility planning document? Does the city's development strategy include monitoring indicators?

Step	Description	Exemplary useful questions
		Does the public transport development program include monitoring indicators?
Review and analysis of secondary data on the current structure and functioning of the urban transport system.	Internal 'data audit' consists of identifying existing and available strategic and operational documents, their monitoring systems, sources of existing data, and a preliminary assessment of their usefulness.	What data can be obtained from the municipal public transport operator? What data can be obtained from shared bicycle systems? Are there available results from market research on residents' transport behaviours? Are there any reports on already conducted marketing research? What do they contain?
Identification of gaps in data on the current structure and functioning of the urban transport system from secondary sources.	Identifying which areas important for sustainable mobility planning shows a 'data deficit' for creating monitoring indicators.	Are there any areas identified in earlier stages that are not reflected in the monitoring and evaluation framework? Are there indicators particularly important for a specific city/area that have not been used so far? If so, why? Can the data be obtained from public sources (e.g., National Statistical Office, rail transport regulator, etc.)?
Determination of necessary primary data on the current structure and functioning of the urban transport system to be collected.	Identifying priority data to be obtained. Identification of which previously identified gaps are particularly problematic and require urgent intervention. Identification of which of the previously identified data gaps are particularly easy to address.	Which data are most needed for monitoring and evaluation? What is the cost and time required to obtain the necessary data? Will the data obtained be reliable?

Step	Description	Exemplary useful questions
Adoption of a methodology for obtaining primary data to define strategic and operational goals and the actions to achieve them.	Establishing the methodological foundations for research in such a way as to ensure its reliability and relevance to the specific nature of the problem being studied, while also enabling the acquisition of valid and practically useful results.	How will the data be collected? Is a standardized data collection methodology ensured, for example, regarding modal split? Is the data collection methodology widely used? How can data reliability be ensured?
Definition of strategic and operational goals, using data on the current structure and functioning of the urban transport system	Establishing strategic and operational goals in such a way that they are based on data, both regarding the necessity of their adoption and the extent to which they can contribute to advancing the realisation of the vision.	Are the defined goals measurable? Are the selected indicators for measuring goal achievement easy and clear for decision-makers?
Identification of actions/measures to achieve strategic and operational goals, utilising data on the current state and functioning of the urban mobility system.	Establishing actions/measures in such a way that they are based on data, both regarding the necessity and feasibility of their implementation, as well as the extent to which they can contribute to advancing the achievement of strategic goals.	Are the planned actions/measures consistent with the goals they are meant to elaborate on? Are there any specific actions/measures that require a separate monitoring indicator to be assigned?
Determination of a set of preferred, planned indicators.	Establishment of indicators that directly correspond to the actions/measures and goals, designed in a way that enables the monitoring of their progress over the coming years.	Is the number of indicators not too large? Have the indicators been defined in a clear and straightforward way? Do the indicators exhibit consistency in terms of the level of detail and scope of measurement?
Review and analysis of data used to monitor changes resulting from implemented actions.	A review of previously collected data with regard to their potential for monitoring the degree of achievement of the established goals and actions (for example, data collected by the Police could be used to monitor the effectiveness of actions taken to improve	Are there any data that have proven costly and/or time-consuming to obtain?

Step	Description	Exemplary useful questions
	road safety). Evaluation whether monitoring the achievement of goals and actions/measures will require the collection of new data that was not gathered prior to the implementation of the goals and actions.	Are there any new data needed for the monitoring of goals and actions/measures?
Identification of gaps in data used to monitor changes resulting from implemented actions from secondary sources.	Identification of whether new gaps in secondary data have emerged as a result of the appearance of new areas requiring analysis, related to the established goals and actions.	Have any gaps in the monitoring framework been observed due to the lack of data?
Design of the monitoring framework and appropriate set of indicators, considering both current and future availability of secondary and primary data.	At this stage, the set of indicators should enable both further diagnosis of the mobility system and oversight of the implementation of the planned actions and goals.	Are the current (reference) values of the monitoring indicators correct? Are the target values of the monitoring indicators realistic (achievable)? Is the final number of indicators not too large? Have monitoring indicators been assigned to all key areas of urban mobility planning?
Implementing the monitoring system process by setting target values for individual indicators, assigning roles to specific units, and adopting a schedule and intervals for updating indicator values.	Establishing detailed frameworks for the monitoring process in such a way that there is no ambiguity regarding what needs to be measured, which data should be collected, when measurements should be taken and data updated, and who is responsible for conducting the measurements and collecting the data.	Have individual indicators/groups of indicators been assigned organizational units responsible for fulfilling them? Are the target values of the indicators achievable? Have the target values of the indicators been embedded in a timeline?
Evaluation of the monitoring scheme through analysis of the effectiveness of implemented actions in achieving the planned strategic goals, including the gap between the planned and actual indicator values.	Oversight of the direction and scale of ongoing changes in such a way that it is possible to determine the difference, or lack thereof, between the anticipated directions and magnitudes of changes in specific indicators and those that were planned.	Have there been deviations from the planned values regarding the monitoring indicators? If so, what are the causes? Are they objective and independent of the actions of

Step	Description	Exemplary useful questions
		local/metropolitan authorities?
Modification of existing strategies and action plans, taking into account the results of the evaluation and changes occurring in various environments (economic, legal, technological, social).	If significant, unforeseen changes in the conditions affecting the functioning of the mobility system are observed, which prevent the implementation of previously planned actions and strategies, it is necessary to modify and adjust them to reflect the new reality.	As a result of the monitoring and evaluation, is it necessary to introduce changes to the content of the mobility plan or other transport and mobility-related documents?
Continuous improvement of the M&E framework regarding its efficiency and effectiveness in genuinely supporting decision-making and actions related to urban mobility.	It is important to remember that the monitoring and evaluation framework should be revised and improved whenever it is observed that it is not achieving the objectives for which it was created.	Are there any new projects being conducted that provide new knowledge on the monitoring and evaluation of urban mobility? Are we identifying new best practices in the monitoring and evaluation of urban mobility that we can implement? Are we actively taking steps to acquire knowledge on the monitoring and evaluation of urban mobility?

It should be emphasised that the individual stages in the above process do not have to occur in a strict sequence. For example, improving the monitoring and evaluation framework in terms of efficiency and effectiveness in supporting decision-making and actions related to urban mobility should be continuous. This means that problems or deficiencies of any nature in the monitoring and evaluation process should be addressed and remedied as soon as they are identified. The continuity of this stage also ensures the flexibility of the entire system, allowing it to adapt to, for instance, the availability of new, previously inaccessible data or the discovery of new relationships between the values of different variables.

To implement the monitoring and evaluation framework, a review of data availability and quality should be conducted. Data used in the process of urban mobility management should be of the highest possible quality. High-quality data is characterized by multiple features simultaneously, such as:

- Accuracy: Data should represent the actual state of affairs without errors or distortions.
- Completeness: Missing data can distort the information derived from them.
- Timeliness: Data should reflect the most current state of the urban mobility system.
- Consistency: Consistent data ensure comparability, even when sourced from different origins.
- Reliability: Data should come from trusted and verified sources.

- Correctness: Data should meet specified standards and quality requirements, resulting from the correct methodologies of their acquisition.
- Availability: Data should be accessible when needed.
- Relevance: Data should correspond as closely as possible to the needs of their users.

In the context of urban mobility management, there is often a discrepancy between the data that is available and the data that is needed and expected for effective and efficient management. The data that can be used in the monitoring system of urban mobility management can thus be categorized into one of three groups:

- Data that is already available.
- Data that is not currently available but can be easily obtained.
- Data that is not currently available, the acquisition of which would be irrational due to cost, labour intensity, legal, technological, or other issues.

It is rational to collect data not only in connection with creating a new strategic document, such as a sustainable urban mobility plan, but primarily through continuous and systematic data collection. This approach enables the continuous identification of areas where significant gaps exist in the data and allows for actions to be taken to eliminate these gaps. Continuous and systematic data collection also aims to facilitate cooperation with external entities by allowing the development of cooperation frameworks. Moreover, a systematic approach should lead to the standardisation of data collection and processing procedures, which in turn facilitates the integration of data from different entities, crucial for effective resource management and accurate analysis, leading to correct conclusions.

Adopting an approach that prioritizes checking and utilising all secondary data sources first, is also considered rational. Secondary data includes information that has been collected, processed, and analysed by other entities or for other research purposes, which can be reused in the planning and management of urban mobility. Secondary data sources particularly important in the monitoring and evaluation process include:

- Public statistics collected by statistical offices, concerning demographics, economy, etc.
- Reports and scientific research.
- Administrative registers, such as population records, vehicle registrations, or road infrastructure data.
- Data from Intelligent Transport Systems, originating from traffic management systems, monitoring systems, or sensors measuring road or bicycle traffic intensity.
- Data from transport operators, public transport authority, or carriers, concerning vehicle occupancy rates, timetables, serviced routes, and stops.
- Geospatial data, mainly GIS, provided by public or private institutions, concerning transport infrastructure or spatial development.
- Results of previous studies, such as public opinions on transport topics or residents' transport preferences and mobility behaviours.
- Data from the enterprise sector, particularly from logistics companies, car-sharing platforms, and bike-sharing services.

After conducting a detailed review of available secondary data, it is necessary to identify areas where these data are insufficient and where key information required for effective and efficient urban mobility management is lacking. Subsequently, the possibility of obtaining primary data should be considered, for example, through surveys, traffic measurements, studies of mobility behaviours, or the use of modern technologies such as mobile applications and IoT sensors. It should be emphasised that some primary research not only requires significant financial resources but also time to conduct methodologically correct studies. Therefore, it is essential to ensure that the time needed to obtain primary data does not exceed the time allocated for planning actions or their evaluation.

Figure 7 The importance of the monitoring and evaluation at different stages of the SUMP based on Rupprecht Consult (2019).

The process of developing a sustainable urban mobility plan is complex in itself and consists of multiple stages, as described in Figure 7. It is important to emphasize that monitoring and evaluation should be considered from the initial stages of developing the mobility plan and integrated throughout the entire process of drafting the document, even though their significance may vary depending on the specific stage.

2.3. General recommendations and risks to be avoided

2.3.1. Risks to be avoided in developing an Monitoring and Evaluation framework for sustainable urban mobility planning

- Overloading the monitoring and evaluation framework with excessive indicators can lead to complexity and inefficiency in the evaluation process, potentially hindering the accurate assessment of sustainable urban mobility planning.
- Too complicated indicators – Complex indicators may be difficult to measure and interpret, leading to confusion or misrepresentation of progress.

- Lack of alignment between indicators and the document's objectives – It's crucial that indicators in the monitoring and evaluation framework are aligned with the document's objectives, ensuring they accurately reflect the goals set out in the strategic plan for sustainable urban mobility planning.
- Indicators not referencing the baseline—to track meaningful progress, indicators must be related to the baseline (initial conditions).
- The target values for indicators are too ambitious. Setting unattainable targets can hinder realistic assessment.
- Monitoring irrelevant issues – Focusing on issues not central to the objectives can divert resources and attention from critical areas.
- Lack of indicator prioritisation—To ensure focus on the most important metrics, Indicators should be categorised (strategic, core, auxiliary).
- No reference to existing strategic documents / Not using indicators from existing strategic documents – The monitoring and evaluation framework should incorporate or align with indicators already established in existing policy or strategy documents.
- Using inconsistent methodologies when assessing goal achievement – For example, applying different definitions of walking trips in the modal split can distort evaluation results over time.
- Lack of clear identification of units responsible for monitoring specific indicators.
- Lack of precise indication of the time intervals for conducting subsequent measurements.
- Lack of ongoing and progressive collaboration with external institutions, authorities, and companies regarding data sharing

2.3.2. General recommendations

- Define the scope of monitoring and evaluation depending on the content of the document, particularly the strategic and operational goals and planned actions. It also varies according to the territorial coverage of the Plan. The monitoring and evaluation scope will differ for a functional urban area (FUA), a city, or even a district or smaller area of a city, such as its centre. The monitoring and evaluation framework should be adaptable, whether it applies to a functional urban area (FUA), a city, or a specific district. For larger regions like FUAs, broader indicators should be used, whereas for smaller areas, local issues should be prioritized.
- In some countries, the key to successful sustainable urban mobility planning lies in a comprehensive review of all strategic and operational documents. This review should focus on identifying the goals, priority actions, and monitoring indicators outlined in these documents.
- An important yet often overlooked aspect of sustainable urban mobility planning is the clear assignment of responsibility for monitoring and evaluation. This responsibility should be assigned to a specific unit within the administrative structure. Additionally, the frequency of evaluations should be determined, taking into account the unique challenges faced by smaller cities.
- It is worthwhile to prioritise monitoring indicators. Strategic indicators should generally include issues such as:
    - Modal split (allowing for long-term analysis of modal shift and covering the main modes of transportation within the analysed area);

- Road traffic safety (the possibility of identifying smaller thematic sub-areas, such as road safety on the way to school);
- Emissions from the transport sector (significant for cities that have undertaken or plan to undertake measurable climate goals to reduce emissions).

They should form a baseline of the monitoring and evaluation framework for sustainable urban mobility planning.

- The engagement of various stakeholders should extend beyond the development of the objectives. Some stakeholders may be helpful, or even essential, in creating the monitoring and evaluation framework and providing data. Examples of stakeholders most often connected to city administration include schools.

Monitoring and evaluation is often viewed through the lens of monitoring indicators, but the scope of activities in this area is much broader. It does not only refer to the Sustainable Mobility Plan itself but also to the whole planning process. This means it is necessary to monitor and evaluate the process of creating and/or updating the document, with a particular focus on stakeholder involvement. This is an often-underappreciated aspect of monitoring and evaluation in sustainable urban mobility planning.

A review of the literature and the results of existing projects on the monitoring and evaluation of urban mobility systems has demonstrated that modal split remains one of the most popular and significant metrics used. This is partly since many key objectives in Sustainable Urban Mobility Plans (SUMPs) are directly related to modal distribution. Consequently, most cities, in their SUMPs, aim to increase the share of active travel modes and public transport while reducing the share of private car use in meeting transportation needs.

The modal split represents the percentage share of different transportation modes (e.g., walking, cycling, driving, public transport) in the total number of trips in a given area. Modal split is a helpful tool for assessing the degree to which specific sustainable travel goals have been achieved, i.e. as demonstrated by the strategic documents of the Swedish city of Gävle. Over 18 years, the plan aimed to double the share of cycling trips, although the baseline in 2012 had already significantly exceeded 10 %. The increase in the share of cycling trips corresponds to a substantial reduction in the importance of private car usage, finally resulting in CO_2 emission reductions.

From the perspective of building a monitoring and evaluation framework, numerous nuances regarding the methodology for calculating the modal split are essential.

Experiences gained from the National Travel Survey for England 2023 show that, with data from the same survey sample, highly varied results can be obtained depending on whether the measurement is based on:

- Number of trips,
- Travel distance,
- Travel time.

The results of the modal split calculation are firmly dependent on the methodology used. Figure 8 presents results obtained from the same sample, meaning data collected from the same city residents, but analyzed using a different methodology that considers the number of trips, distance, and travel time.

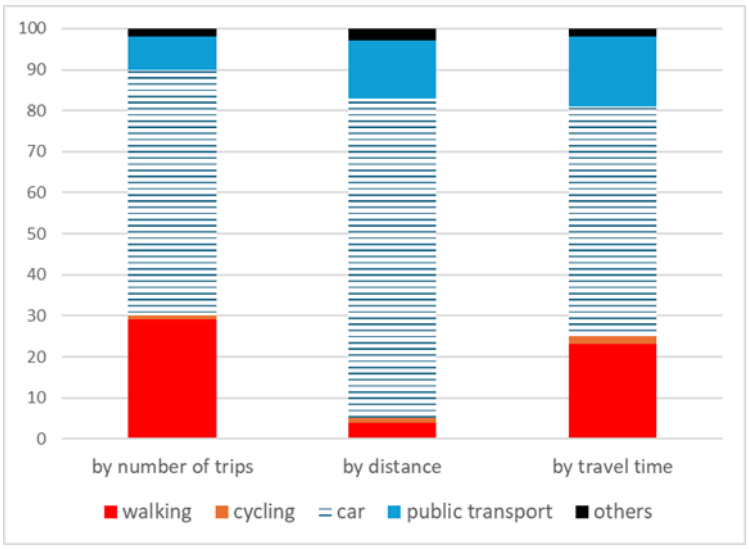

Figure 8 Results of the modal split calculation based on the same sample but the different methodological approach from the National Travel Survey of England, (Department for Transport, 2024)

The modal split is also strongly dependent on travel distance. Short trips (up to 1 km) are typically conducted on foot, while the share of car trips increases with longer distances. As demonstrated by the example of Greifswald, Germany, the share of walking trips can range from 56% (up to 1 km) to just 2% (over 10 km), whereas the share of car trips ranges from 6% (up to 1 km) to 90% (over 10 km) (see Figure 9). Awareness of such large variations in modal split calculations is crucial for effectively planning strategies and actions.

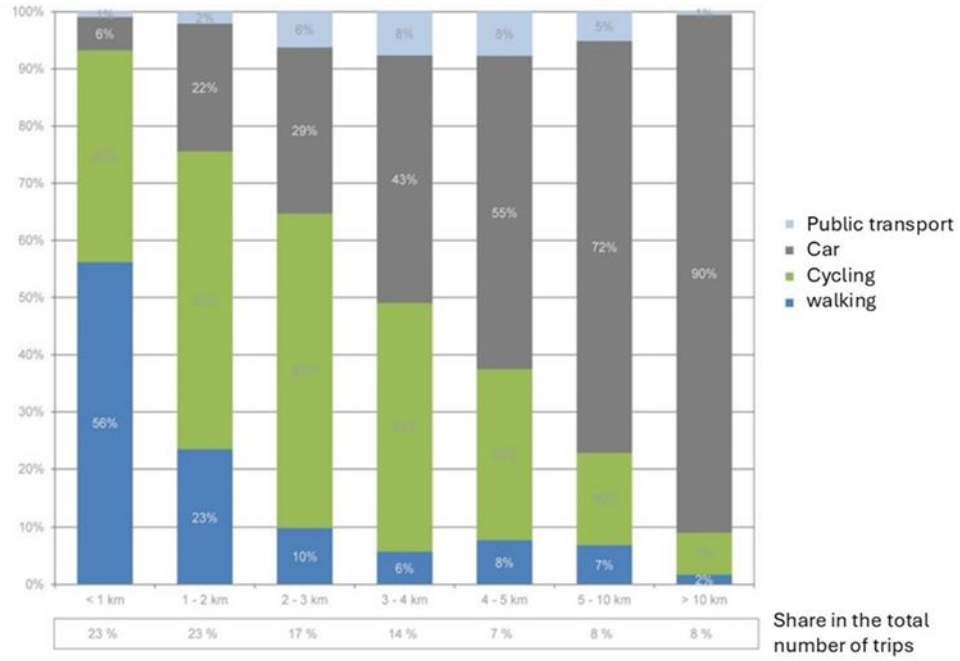

Figure 9 Variation in the share of walking trips depending on travel distance from modal split of Greifswald, Germany (Universitäts und Hansestadt Greifswald, 2017)

Another important nuance concerning the monitoring of the modal split is that it can vary significantly across different areas of the city. For example, in Bremen, Germany (Figure 10), the share of walking trips can range between 19-35%, while the share of trips made by private cars varies between 18-49%,

depending on the specific region of the city being analysed. Once again, knowledge of these variations in modal split across different parts of the city is critical for developing strategies and actions tailored to the actual mobility conditions in each area.

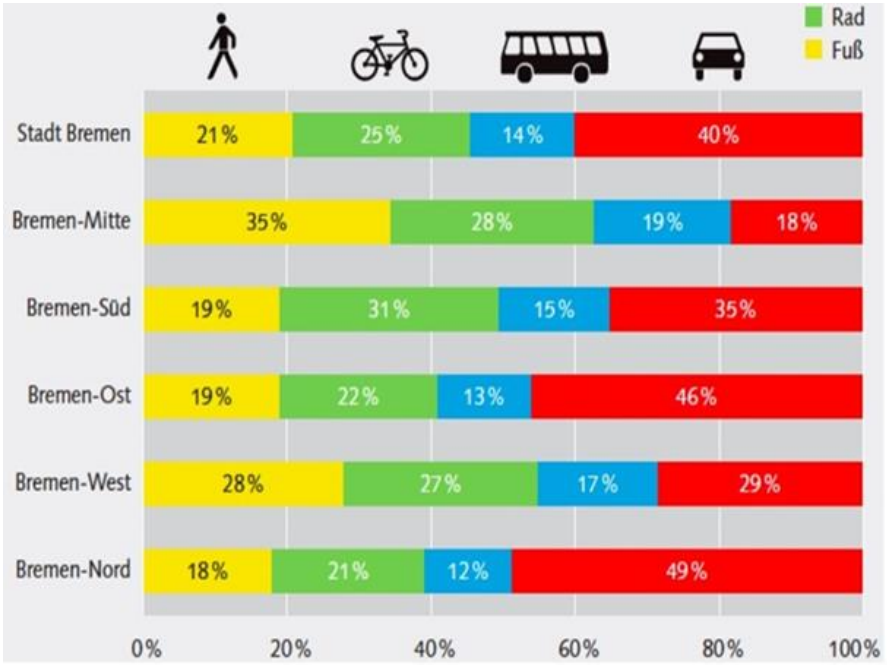

Figure 10 Modal-split calculation for the city and its districts in Bremen, Germany, (Senate Department for Environment, 2016)

It is recommended to verify the existence of national guidelines, recommendations, or requirements regarding the methodology for measuring the modal split before initiating any measurement. A good practice is to adopt methodologies developed by more experienced cities within the same country, particularly those with a proven track record in measuring modal split. This approach makes it easier to compare results and facilitates knowledge sharing, such as best practices that have clearly contributed to achieving desired changes in the modal split, both in direction (meaning the shift towards preferred modes of transport, such as increased use of public transportation or cycling) and scale (referring to the magnitude or extent of these shifts within the population).

It is important also to consider a variety of factors that influence that modal split, only some of which are within the control of local and regional authorities. Issues such as national transport policies, fuel and electricity prices, the tax system, etc., remain outside the influence of the authorities responsible for implementing solutions outlined in the mobility plan or a similar document.

2.4. Collaboration with key stakeholders

One of the fundamental ideas that differentiates sustainable urban mobility plans from traditional transport documents is the extensive public engagement in the document creation process and the collection of data from a wide range of urban mobility stakeholders, whose interests are often conflicting or not always aligned with the goals of sustainable development. Table 4 presents a review of the key stakeholders, along with examples of the types of data that could be sought from them.

Table 4 Overview of key stakeholders, based on self-study

Stakeholder	City dependant?	Example of potential data
Public Transport (PT) authority	Yes	Frequency of PT, supply of PT, data on number of passengers, data on quality of public transport services (punctuality, reliability, passenger satisfaction level among different social groups), modal split.
Public transport operator	Yes & No	Number of passengers, number of passenger kilometres, rolling stock quantity and structure, number and value of ticket sales.
Railway infra manager	No	Number of passengers on a railway station, parking slots around a railway station, parking slots occupancy rate, cycling parking slots around a railway station, number of bikes parked in the vicinity of a particular railway station
Railway operator	No	Number of passengers, number of passenger-kilometres
Shared-mobility operator	No	Number of vehicle-kilometres, The share of zero-emission vehicles in the entire fleet
Food or shopping delivery platforms	No	Number of vehicle-kilometres, the share of zero-emission vehicles in the entire fleet, the share of services performed by bicycles, scooters, and cars
Shopping mall	No	Number of visitors, number of parking slots, occupancy of parking slots, “local modal split”
Science park & business park	Yes & No	Number of employees, number of parking slots, “local modal split”.
University	No	Number of students, number of cyclists, number of parking slots, “local” modal split
Primary schools & kindergartens	Yes	Number of kids/pupils, „gravity area”, number of cyclists (counted by the personnel)
Secondary schools	Yes & No	Number of pupils, „gravity area”, number of cyclists (counted by the personnel)
Hospitals	Yes & No	Number of employees, number of visitors, number of parking slots
Harbour	Yes & No	Modal split for freight, traffic intensity

Apart from the key stakeholders mentioned in the table, there are some stakeholders that can provide valuable data but are often overlooked. One of those is Bus drivers who represent a valuable source of data and insight into the development of Sustainable Urban Mobility Plans (SUMPs), particularly with regard to the performance of the public transport system. Their input is especially significant due to their daily engagement with real-time traffic conditions, infrastructure, vehicle fleets, and user behaviour. Bus drivers are uniquely positioned to provide critical information on schedule adherence, delays resulting from traffic congestion, issues related to bus stop infrastructure, and specific challenges encountered

while navigating various areas, including fluctuations in traffic volumes at different times of day. Their observations also allow the identification of locations and critical points within the transport system that may require optimisation in terms of safety and operational efficiency. Appendix 3 includes an example of a questionnaire designed to gather data from bus drivers.

Another example of an overlooked stakeholder group is the employees of the large office complexes. Appendix 4 presents an example of a questionnaire that can be used to collect mobility data from large office complexes. Employees of such complexes possess several key characteristics that make their knowledge particularly valuable in understanding the urban mobility system. These characteristics include the regularity of their commutes, the high frequency of their travel to and from the workplace, and their heightened awareness of the transportation conditions surrounding their journeys. Additionally, studying large office complexes allows for the efficient collection of data and insights from a substantial number of individuals simultaneously, enhancing the robustness of the findings.

Educational institutions are a significant component of the local labour market, particularly in smaller or less diverse economies. Nevertheless, they are also often overlooked as an important source of data for sustainable urban mobility planning. Apart from the obvious stakeholders, there are some underestimated groups within the educational sector, such as parents and guardians and other individuals using the schools infrastructure. Appendix 5 explains the education sector as a potential source of data on urban mobility in detail, while Appendix 6 gives an example of a questionnaire to the school principals.

2.5. Proposed indicators

In Tables of indicators 1-7, the proposed Key Performance Indicators (KPIs) are presented, which can be utilised in the process of developing and monitoring the implementation of SUMPs. In addition to the KPIs, the table includes objectives associated with each indicator. This facilitates the selection of KPIs following the intended directions and areas of change in mobility systems encompassed within a given SUMP. Furthermore, examples of proposed target values that can be linked to specific KPIs are provided, aiming to simplify the integration of SUMP objectives with the monitoring and evaluation framework. As emphasised multiple times in this document, this integration is crucial for the success and effectiveness of the applied set of KPIs.

The tables also present recommendations regarding the relevance of particular indicators for very small (around 40,000 residents), small (around 80,000 residents), and medium-sized cities (around 200,000 residents). However, it should be noted that these are merely suggestions. This implies that each case, namely, each urban mobility system in a given city requires individual analysis to tailor the set of KPIs to its actual needs and expectations. The indicators presented in the table have been evaluated based on the following scale to determine their relevance for very small, small, and medium-sized cities:

- +++ : Indicators of critical relevance for cities of a specified size,
- ++ : Indicators of high relevance for cities of a specified size,
- + : Indicators of moderate relevance for cities of a specified size.

One of the key areas of monitoring within SUMPs is pedestrian mobility. Pedestrian mobility is, first and foremost, the most sustainable form of transportation, contributing to the reduction of pollution, CO2

emissions, and traffic congestion. Moreover, promoting walking has a direct impact on public health by encouraging physical activity and improving the overall quality of life for residents. Pedestrian mobility also plays a crucial role in integrating different modes of transportation, particularly in combination with public transport journeys.

Walking is a foundation of urban mobility, especially in small towns and municipalities. Every journey begins and ends with walking. It's so natural that it's often not considered a "means of transport". People walk not only because they need to travel (walking for pleasure, sports, etc.). A lack of walking – the most natural form of physical activity, harms human health, which became obvious during the COVID-19 pandemic.

The growing role of active mobility (especially walking) is a global trend, particularly in city centre areas. Increasing the share of walking trips within the city's travel structure is recognised as one of the most economically, socially, health-wise, environmentally, and transport-efficient solutions. Among the transport benefits are increased mobility and accessibility, reduced reliance on private cars, reduced demand for parking spaces, and improved safety for all transport users. The active mobility has gained importance thanks to the popularisation of Sustainable Urban Mobility Plans.

Walking is also the most space-efficient way of getting around in a city (Figure 11).

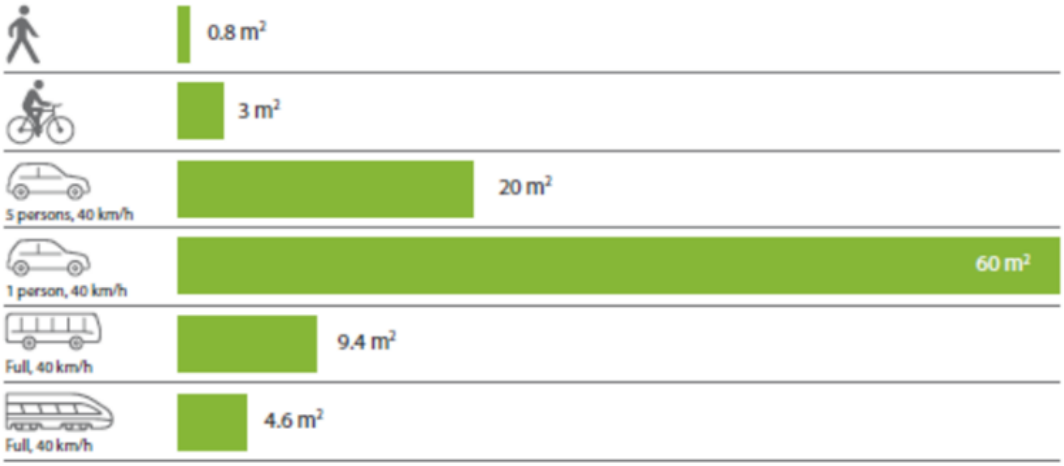

Figure 11 Spatial efficiency of different means of urban mobility per person (Vienna City Administration, 2015)

However, several challenges arise when collecting data on the actual state of pedestrian mobility in a given city. These challenges include:

- The significant influence of weather conditions on measurement results, especially when using observational methods,
- High seasonal fluctuations,
- Difficulties in capturing short-distance trips, leading to their underestimation in analyses,
- A wide range of diverse factors affecting pedestrian traffic density in different areas of the city,
- Often insufficient networks of monitoring devices, such as cameras or pedestrian counters.

Table of indicators 1 Proposed Key Performance Indicators for Very Small, Small, and Medium-sized Cities (Walking)

Walking							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
1	Increase in the share of walking trips in modal split	**Share of walking trips**	Increase the share of walking trips to 30% of total trips by 2030	%	+++	+++	+++
2	Increase in the average number of walking trips made by residents	**Average number of walking trips per person**	Achieve an average of 4 walking trips per resident per day by 2030	number	++	++	++
3	Increase in the number of residents living very close to the city centre	**A number of residents located within 3km from the centre**	Increase the number of residents living within 3 km of the city center by 10% by 2030	number	+	+	++
4	Increase in the number of residents living near the city center	**A number of residents located within 5km from the centre**	Increase the number of residents living within 5 km of the city center by 15% by 2030	number	+	+	++
5	Increase in the number of residents living in areas covered by planning documents	**Number of residences in areas with planning documents [local spatial plans]**	Ensure 90% of residents live in areas covered by urban planning documents by 2030	number	+	+	+++
6	Increase in the number of residents in a given city	**Number of new** residents **per year**	Increase the city's population by 5% by 2030	number	+	+	++
7	Increase in the density of the sidewalk network	**Number of kilometres of sidewalks per square kilometre**	Increase the sidewalk network density to 10 km of sidewalks per square kilometre by 2030	number	+++	+++	+++
8	Increase in the area of walking zones	**Number of square kilometres of walking zone**	Expand pedestrian zones by 20% by 2030	number	+	+	+++
9	Decrease in the number of accidents involving pedestrians	**Number of pedestrians injured in all accidents**	Reduce pedestrian-related accidents by 30% by 2030	number	+++	+++	+++
10	Decrease in the number of accidents involving private cars	**Number of pedestrians injured in road accidents with cars**	Reduce car accidents by 20% by 2030	number	++	++	+++
11	Decrease in the number of accidents involving non-motorized vehicles	**Number of pedestrians injured in road accidents involving non-motorized vehicles (including bicycles, electric scooters, and other similar modes)**	Reduce non-motorized vehicle accidents by 25% by 2030	number	++	++	+++
12	Decrease in the length of roads without street lights	**Length of roads without street lighting**	Reduce unlit road sections by 50% by 2030	km	++	++	+++
13	Decrease in the length of roads without sidewalks	**Length of roads without sidewalk**	Eliminate all roads without sidewalks within the city by 2030	km	+++	+++	+++
14	Increase in the share of raised pedestrian crossings	**Share of raised pedestrian crossings in the total number of crossings**	Install raised pedestrian crossings at 50% of all major intersections by 2030	%	++	++	++

Walking							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
15	Decrease in the percentage of students with overweight	**Percentage of overweight or obese middle school students**	Reduce the percentage of overweight students by 10% by 2030	%	++	++	++
16	Increase in the share of the population with access to recreational areas within walking distance	**Share of population with access to areas of recreation no longer than 500 meters from home**	Ensure that 95% of the population has access to a recreational area within a 10-minute walk by 2030	%	+	+	++
17	Increase in the number of projects/initiatives aimed at improving walking conditions	**Number of projects/initiatives aimed at improving walking conditions**	Implement at least 10 new projects to improve walking conditions by 2030	number	+	+	++
18	Increase in the financial value of projects/initiatives aimed at improving walking conditions	**Financial value of projects/initiatives aimed at improving walking conditions**	Allocate at least 20 million euros to walking infrastructure improvement projects by 2030	EUR	+	+	++
19	Increase in the number of students involved in programs promoting sustainable mobility	**Number of school students involved in sustainable mobility promotion campaigns**	Enrol 50% of all students in sustainable mobility education programs by 2030	number	+	+	++
20	Increase in the number of businesses and institutions involved in programs promoting sustainable mobility	**Number of businesses and institutions included in sustainable mobility promotion campaigns**	Engage 10 local businesses and institutions in sustainable mobility programs by 2030	number	+	+	++
21	Increase in the number of students involved in programs promoting education on sustainable mobility	**Number of school students participating in transport education programs**	Involve 75% of primary and secondary schools in sustainable mobility education by 2030	number	+	+	++
22	Increase in the area of green spaces	**Green areas [green areas per inhabitant]**	Expand green spaces by 15% by 2030	km2	+	+	++
23	Decrease in the time difference between walking and car travel times	**The ratio of time required for walking compared to driving by car to a given destination**	Reduce the walking vs car travel time difference by 20% by 2030	Ratio	++	++	++
24	Increase pedestrian satisfaction	**Satisfaction of pedestrian**	Achieve an 85% satisfaction rate among pedestrians	%	+++	+++	+++

Given that bicycle travel, alongside walking, constitutes one of the most desirable forms of sustainable urban mobility, its monitoring is crucial for the effective planning of transport policies based on sustainable development. Similar challenges and issues arise in the monitoring of bicycle travel as in the case of pedestrian travel. Since the safety and comfort of cycling are strongly linked to the condition of dedicated cycling infrastructure, this aspect is a significant focus of the KPIs presented in Table of indicators 2.

Table of indicators 2 Proposed Key Performance Indicators for Very Small, Small, and Medium-sized Cities (Cycling and micromobility)

Cycling and micromobility							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
25	Increase the share of bicycle trips within the overall transport mode split	**Share of bicycle trips**	Increase the share of bicycle trips to 15% of all trips by 2030	%	+++	+++	+++
26	Expand the Bike & Ride infrastructure by increasing the number of covered bicycle parking lots at key transfer points	**Number of covered Bike & Ride parking lots at transfer points**	Build 50 new covered Bike & Ride parking by 2030	number	+	+	++
27	Increase the number of cyclists passing through fixed count points	**The number of cyclists measured in fixed count-points**	Increase the number of cyclists passing through fixed count-points by 20% by 2030	number	++	++	+++
28	Encourage residents to choose cycling more frequently for short-distance trips	**The number of trips under 4 km with a bike**	Achieve 30% of all trips under 4 km to be done by bike by 2030	number	++	++	++
29	Increase the availability of newly constructed or modernised bicycle paths near major transfer hubs to facilitate cycling as part of multi-modal journeys	**Share of the length of constructed or modernised bicycle paths within a 3 km range of a transfer hub**	Ensure 80% of constructed or modernised bicycle paths are within 3 km of transfer hubs by 2030	%	+	+	++
30	Develop the density of the cycling road network	**Number of km of bike roads per km²**	Increase the number of bike roads to 2 km per km² by 2030	km/km2	+++	+++	++++
31	Expand the total length of bicycle paths	**Total length of bicycle paths**	Expand the total length of bicycle paths to 500 km by 2030	km	+++	+++	+++
32	Increase the number of bicycle parking facilities	**Number of bicycle parking facilities**	Build 1,000 new bicycle parking facilities by 2030	number	+	+	++
33	Increase the proportion of cycling roads relative to the total road network	**Number of km of bike roads per km of roads**	Reach a ratio of 0.5 km of bike roads for every 1 km of road by 2030	Ratio	++	++	++
34	Increase the percentage of bicycle racks that allow secure frame-locking, improving the safety of cyclists	**Percentage of bike racks with the potential to lock the bike frame**	Ensure that 90% of all bike racks allow secure locking of the bike frame by 2030	%	+	+	++
35	Optimise the cycling network	**Share of bike paths where the distance from residential areas to key destinations (such as schools) via the bike network does not exceed 1.5 times the direct physical distance between those points**	Ensure that by 2030, 75% of bike paths connecting residential areas to key destinations do not exceed 1.5 times the direct physical distance	%	+	+	++
36	Reduce the number of traffic incidents involving cyclists	**Number of traffic incidents involving cyclists**	Reduce traffic incidents involving cyclists by 30% by 2030	number	+++	+++	+++

Cycling and micromobility							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
37	Limit the number of bike lanes with mixed traffic on roads with speeds over 30 km/h by creating more dedicated cycling paths	**Bicycle lanes with mixed traffic in streets with signed speeds higher than 30 km/h**	Limit the share of bicycle lanes on roads with mixed traffic and speeds over 30 km/h to less than 10% by 2030	km	+	+	++
38	Reduce the number of cyclists injured in road accidents	**Number of cyclists injured in road accidents**	Decrease the number of cyclists injured in road accidents by 40% by 2030	number	+++	+++	+++
39	Expand the availability of subsidies and financial support for residents to purchase electric bicycles	**Number of subsidies for the purchase of electric bicycles for residents**	Provide subsidies for 5,000 electric bicycles for residents by 2030	number	+	+	++
40	Increase the number of projects and initiatives aimed at improving cycling conditions	**Number of projects/initiatives aimed at improving cycling conditions**	Implement at least 15 new cycling improvement projects by 2030	number	+	+	++
41	Increase the financial investment in projects focused on improving cycling conditions	**Value of projects/initiatives aimed at improving cycling conditions**	Allocate 20 million euros to cycling infrastructure improvement projects by 2030	EUR	+	++	++
42	Reduce the time difference between cycling and car travel	**The ratio of time required for cycling compared to driving by car to a given destination**	Reduce the time ratio for cycling compared to driving to less than 1.8 by 2030	Ratio	++	++	++

One of the key objectives of public transport is to provide a viable alternative to private car travel. To achieve this, it is essential to develop a dense and well-connected transport network that enables quick and convenient movement between key areas of the city, minimising the time differences between public transport and private car journeys. The KPIs presented in Table of indicators 3 are directly linked to these goals, ensuring that public transport becomes an efficient and competitive option for urban mobility.

Table of indicators 3 Proposed Key Performance Indicators for Very Small, Small, and Medium-sized Cities (Public transport)

Public transport							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
43	Increase public transport's share of overall trips	**Share of public transport trips**	Increase the share of public transport trips to 30% of all city trips by 2030	%	+++	+++	+++
44	Grow the number of public transport users	**Number of public transport users**	Achieve a 15% increase in the number of public transport users by 2030	number	++	++	+++
45	Increase the proportion of the public transit within motorised traffic	**Share of motorised traffic that comes from public transit**	Increase the share of motorised traffic from public transit to 25% by 2030	%	+	+	++

Public transport							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
46	Ensure more people live within 5 minutes of a bus stop	**Number of inhabitants within a 5-minute walking isochrone to a bus stop**	Ensure 90% of inhabitants live within a 5-minute walking distance from a bus stop by 2030	number	++	++	++
47	Improve access to public transport stops for more residents	**Percentage of residents with good access to public transport stops**	Increase the percentage of residents with good access to public transport stops to 85% by 2030	%	++	++	++
48	Increase the percentage of the population with very good access to public transit stops via walking	**Percentage of residents with very good access to public transport stops**	Ensure 75% of residents have very good access to public transport stops by 2030	%	++	++	++
49	Increase the number of residents able to travel by rail to the city center or metropolitan area within 60 minutes, taking into account the need to walk to the railway station	**Number of residents able to reach the city center or metropolitan area within 60 minutes using rail transport**	Ensure that by 2030, 80% of residents live within a 60-minute access to the city center by rail transport	number	+	+	++
50	Ensure key locations (schools, offices) have frequent bus services	**Share of significant traffic generators (ie, schools, offices, health centres and hospitals, workplaces employing over 250 people) within a 5-minute walking isochrone to a bus stop served by at least 4 services per hour between 6:00 AM and 8:00 PM among all significant traffic generators**	Reach 90% of significant traffic generators with high-frequency bus services by 2030	%	+	+	++
51	Increase the percentage of residents living close to railway stations	**Share of residents within a 10-minute walking isochrone to railway stations among all residents**	Ensure 85% of residents live within a 10-minute walk of railway stations by 2030	%	++	++	++
52	Expand the length of tramway routes	**Length of single-track tramway routes**	Expand single-track tramway routes by 20 km by 2030	km	+	+	++
53	Increase the number of sheltered bus stops	**Share of bus stops with shelters**	Equip 95% of bus stops with shelters by 2030	%	++	++	++
54	Ensure more residents live close to bus services	**Number of residents with accessibility to bus traffic in a radius of 300 meters from where they live**	Ensure 10 000 residents have bus stops within a 300-meter radius of their homes by 2030	number	++	++	++
55	Increase the distance covered by public transport per person	**Number of PT vehicle-kilometres per capita**	Increase the number of public transport vehicle-kilometres per capita to 200 km by 2030	number	+++	+++	+++

Public transport							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
56	Raise the number of buses relative to the population	**Number of city buses per 1,000 inhabitants**	Achieve a ratio of 2 buses per 1,000 inhabitants by 2030	number	+++	+++	+++
57	Expand the number of emission-free transport lines	**Number of public transport lines operated with emission-free vehicles**	Ensure 30% of public transport lines are operated using emission-free vehicles by 2030	number	+++	+++	+++
58	Ensure more districts have emission-free transport services	**Number of districts served by emission-free urban transport**	Cover 75% of all city districts with emission-free urban transport services by 2030	number	+	+	++
59	Boost renewable energy use in public transport	**The share of renewable energy in the energy mix supplied to electric vehicles, urban transport (incl trolleybuses)**	Ensure 80% of the energy used by electric public transport vehicles comes from renewable sources by 2030	%	+	+	++
60	Increase the use of zero-emission vehicles in public transport	**Number of vehicle-kilometres powered by zero-emission engines (trams, electric & hydrogen buses)**	Increase the vehicle-kilometres powered by zero-emission engines by 25% by 2030	number	+++	+++	+++
61	Expand the share of zero-emission buses	**Share of zero-emission buses in the entire fleet**	Achieve a 40% share of zero-emission buses in the public transport fleet by 2030	%	+++	+++	+++
62	Increase the number of low-emission buses	**Share of low-emission buses (LNG, CNG, hybrid) in the entire fleet**	Ensure that low-emission buses make up 60% of the public transport fleet by 2030	%	+++	+++	+++
63	Reduce CO2 emissions through zero-emission buses	**The amount of CO2 emissions avoided annually due to zero-emission buses**	Reduce CO2 emissions by 50,000 tons annually due to the deployment of zero-emission buses by 2030	t CO2	+	+	++
64	Reduce road accidents involving public transport	**Number of road accidents involving public transport vehicles**	Reduce road accidents involving public transport vehicles by 20% by 2030	number	++	++	+++
65	Expand dedicated bus lanes	**Total length of separated bus lanes for public transport vehicles**	Expand the length of dedicated bus lanes to 100 km by 2030	km	+	+	+++
66	Increase bus usage of dedicated lanes	**Number of vehicle kilometers operated by buses using bus lanes**	Increase vehicle kilometers operated by buses using bus lanes by 30% by 2030	number	++	++	+++
67	Engage more employees in promoting sustainable mobility	**Number of employees of companies involved in sustainable mobility promotion campaigns**	Engage 1,000 employees in sustainable mobility campaigns by 2030	number	+	+	+++

Public transport							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
68	Increase the number of schools that include the topics of clean air and sustainable mobility in their curriculum	**Number of educational institutions in which the topic of clean air, healthy environment and electromobility was introduced**	Introduce the topic of clean air and electromobility into the curriculum of 50 educational institutions by 2030	number	+	+	++
69	Expand municipal events focused on e-mobility education	**Number of educational events carried out by the municipality in the field of e-mobility**	Organize 20 e-mobility educational events by the municipality each year	number	+	+	++
70	Improve bus speeds by using bus lanes and traffic priority	**Average speed of city buses**	Increase the average speed of city buses to 25 km/h by 2030 through dedicated lanes and priority measures	km/h	+	+	++
71	Increase integration of public transport operators on one platform	**Share of public transport organisers in the integrated public transport service platform system**	Achieve full integration of all public transport operators into a unified service platform by 2030	%	+	+	++
72	Modernise the railway fleet	**Share of railway rolling stock units less than 20 years old**	Ensure that 75% of railway rolling stock is less than 20 years old by 2030	%	+	+	++
73	Upgrade older tram fleets	**Share of tramway rolling stock units less than 20 years old**	Reach 70% of tramway rolling stock less than 20 years old by 2030	%	+	+	++
74	Increase the percentage of on-time public transport services	**Share of punctual departures in the total number of departures**	Achieve a 95% rate of punctual departures for public transport services by 2030	%	++	++	+++
75	Make public transport more time-competitive with cars	**Travel time ratio between public transit and car**	Reduce the travel time ratio between public transit and cars to 1.2 by 2030	Ratio	++	++	+++
76	Equip more intersections with public transport priority	**Number of intersections with priority for public transport**	Equip 80 intersections with public transport priority measures by 2030	number	+	+	++
77	Expand free public transport eligibility	**Percentage of residents entitled to free public transport rides**	Ensure 20% of residents are entitled to free public transport rides by 2030	%	++	++	+++
78	Increase eligibility for discounted fares	**Percentage of residents eligible for discounted public transport fares**	Ensure 35% of residents are eligible for discounted public transport fares by 2030	%	++	++	+++
79	Ensure all buses are accessible for people with limited mobility	**Share of buses adapted to the needs of people with limited mobility**	Ensure that 100% of buses are adapted for people with limited mobility by 2030	%	+++	+++	+++

The concept of sustainable urban development necessitates reducing the use of private cars for transportation. In line with this direction, alongside efforts to promote other, more sustainable modes of travel, actions related to parking policies and the establishment of traffic-calmed zones and low-emission zones are also crucial. Additional desired changes in car-based mobility within cities include increasing the share of zero-emission vehicles, eliminating road accidents, and promoting the use of shared vehicles instead of privately owned ones. These areas are addressed by the KPIs presented in Table of indicators 4.

Table of indicators 4 Proposed Key Performance Indicators for Very Small, Small, and Medium-sized Cities (Cars)

Cars							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
80	Reduce the share of car trips	**Share of trips by car**	Reduce the share of trips by car to 40% by 2030	%	+++	+++	+++
81	Increase revenue from paid parking zones	**Revenue from the paid parking zone per parking slot**	Increase revenue from paid parking zones by 15% annually	EUR	+	+	+++
82	Equip more crossings with intelligent transport systems	**Number of crossings covered by the intelligent transport system**	Equip 90% of major intersections with intelligent transport systems by 2030	number	+	+	+++
83	Expand the area of paid parking zones	**Total area of the parking zone**	Covering an area of 35 km² with paid parking zones by 2030	km2	+	+	+++
84	Expand the area of paid parking zones within the city	**Area of the paid parking zone/area of the city**	Expand paid parking zones to cover 25% of the city by 2030	Ratio	+	+	++
85	Reduce the proportion of roads with sand and gravel surfaces	**The share of roads with a sand and gravel surface**	Reduce the share of sand and gravel roads to less than 5% by 2030	%	++	++	++
86	Increase the number of Park&Ride parking spaces	**Number of parking spaces within the Park&Ride system**	Increase Park&Ride parking spaces by 50% by 2030	number	+	+	+++
87	Decrease the number of passenger cars per capita	**Number of passenger cars per 1,000 inhabitants**	Decrease the number of passenger cars per 1,000 inhabitants by 10% by 2030	number / 1000 inhabitans	+++	+++	+++
88	Increase the number of charging stations for electric vehicles	**Number of charging stations per 1 000 cars**	Provide 50 charging stations per 1,000 cars by 2030	number / 1000 inhabitans	++	++	+++
89	Maintain an adequate number of parking slots for residents	**Number of public parking slots per 1000 inhabitants**	Maintain 300 public parking spaces per 1,000 inhabitants	number / 1000 inhabitans	++	++	+++
90	Maintain a sufficient number of public parking spaces per 1,000 cars	**Number of public parking slots per 1,000 cars**	Maintain 300 public parking spaces per 1,000 cars	Number / 1000 cars	++	++	+++
91	Increase the share of electric cars in the vehicle fleet	**Share of electric cars in the total number of vehicles registered in a city**	Increase the share of electric cars to 15% of all registered vehicles by 2030	%	+	+	++
92	Build more hydrogen refuelling stations	**Number of publicly accessible hydrogen refuelling stations**	Build 5 hydrogen refuelling stations by 2030	number	++	++	+++

Cars							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
93	Increase the power of photovoltaic systems used for charging municipal vehicles	**Power of photovoltaic farms and panels on municipal facilities that are used to charge municipal vehicles**	Increase photovoltaic power generation by 30% by 2030	kW	+	+	++
94	Reduce CO2 emissions from the transport sector	**CO2 emissions from the transport sector (SUMI Indicator) Tonnes of CO2 equivalent per 100 thousand residents**	Reduce CO2 emissions from transport by 20% per 100,000 residents by 2030	t CO2	+	+	++
95	Improve air quality by reducing PM25 emissions	**Air quality – emission of PM2,5 from the transport sector (SUMI Indicator) Kilograms of PM2,5 per 100 thousand residents**	Decrease PM25 emissions by 25% by 2030	kg PM2,5 / 100 000 inhabitans	++	++	+++
96	Conduct more comprehensive transport emissions tests in urban areas	**Number of urban centres where comprehensive transport emissions tests were carried out**	Conduct emissions tests in 10 urban centers by 2030	number	+	+	++
97	Cut overall greenhouse gas emissions per inhabitant	**Emissions to Air of Greenhouse Gases in Total, Tons CO2-Equivalents per Inhabitant**	Cut greenhouse gas emissions by 15% per inhabitant by 2030	Tons CO2-Equivalents / Inhabitant	++	++	++
98	Expand the share of zero-emission vehicles	**Share of zero-emission cars (electric, hydrogen)**	Increase the share of zero-emission cars to 20% by 2030	%	++	++	++
99	Increase the number of low-emission vehicles in the fleet	**Share of low-emission cars (LNG, hybrid)**	Reach 35% of low-emission cars by 2030	%	++	++	++
100	Grow the proportion of zero-emission vehicles in company fleets	**Share of zero-emission vehicles in the company's fleets**	Ensure 50% of company fleets are zero-emission by 2030	%	++	++	++
101	Increase the number of low-emission cars in company fleets	**Share of low-emission cars vehicles in the company's fleets**	Reach 70% of low-emission cars in company fleets by 2030	%	++	++	++
102	Establishing new speed-limited zones around schools	**Number of schools and preschools near roads with limited speed zones**	Ensure 90% of schools and preschools are located near limited speed zones by 2030	number	+++	+++	+++
103	Expand the length of roads covered by 30 km/h zones	**Length of roads in 30 km/h zones/ total length of roads**	Increase 30 km/h zones to cover 40% of the total road length by 2030	Ratio	++	++	+++
114	Expand traffic-calmed zones	**Number of km of traffic-calmed zones (ie Tempo 30)**	Increase traffic-calmed zones to 100 km by 2030	km	++	++	+++

Cars							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
105	Reduce the number of fatal road accidents	**Number of fatal road accidents per 1000 inhabitants**	Reduce fatal road accidents by 50% by 2030	number	+++	+++	+++
106	Implement more "school streets" and "neighbourhood streets"	**Number of implementations of "school streets" and "neighbourhood streets"**	Implement 30 km of "school streets" and "neighbourhood streets" by 2030	number	++	++	+++
107	Reduce the number of road accidents involving cars	**Number of road accidents involving cars**	Reduce road accidents involving cars by 20% by 2030	number	+++	+++	+++
108	Increase the percentage of schools in traffic-calmed areas	**Percentage of schools in the area with implemented traffic-calmed zones**	Ensure 75% of schools have traffic-calmed zones by 2030	%	++	++	+++

Given the desire to reduce the demand for parking space, optimize resources, support changes in social attitudes, and improve transport accessibility, it is essential to promote various forms of shared mobility. Therefore, Table of indicators 6 presents KPIs aimed at monitoring various aspects of shared transport, including the scale of development, safety of travel, and the overall adoption of different forms such as bike-sharing, car-sharing, and e-scooter sharing.

Table of indicators 5 Proposed Key Performance Indicators for Very Small, Small, and Medium-sized Cities (Shared mobility)

Shared mobility							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
109	Increase the utilisation of public bikes	**Number of public bike rentals per 1 bike**	Achieve 10 rentals per bike per day by 2030	number	++	++	+++
110	Increase the number of public bike rentals	**Total number of bike rentals in the bike-sharing system**	Achieve 300 000 rentals per year by 2030	number	++	++	+++
111	Expand the car-sharing user base	**Number of car-sharing users**	Increase car-sharing users by 20% annually through 2030	number	+	+	+++
112	Promote higher usage of shared cars	**Average annual mileage of a shared car**	Reach 15,000 km per shared car per year by 2030	km	+	+	+++
113	Encourage greater use of shared bikes	**Average annual mileage of a shared bike**	Achieve 2,500 km per shared bike annually by 2030	km	+	+	++
114	Increase the usage of shared e-scooters	**Average annual mileage of a shared e-scooter**	Reach 1,500 km per shared e-scooter per year by 2030	km	+	+	++
115	Grow the percentage of residents using car-sharing	**Percentage of residents with car-sharing memberships**	10% of residents with car-sharing memberships by 2030	%	+	+	++

Shared mobility							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
116	Increase bike-sharing memberships	**Percentage of residents with bike-sharing memberships**	15% of residents with bike-sharing memberships by 2030	%	+	+	++
117	Expand the availability of car-sharing vehicles	**Number of carsharing vehicles per 1000 inhabitants**	Provide 5 car-sharing vehicles per 1,000 inhabitants by 2030	number	+	+	+++
118	Increase the number of shared bikes	**Number of shared bikes per 1000 residents**	Offer 10 shared bikes per 1,000 residents by 2030	number	+	+	++
119	Expand the number of shared e-scooters	**Number of shared e-scooters per 1000 residents**	Provide 8 shared e-scooters per 1,000 residents by 2030	number	+	+	++
120	Increase the share of electric bikes in the fleet	**Share of electric bikes in bike-sharing fleet**	40% of the bike-sharing fleet to be electric by 2030	%	+	+	++
121	Boost the share of electric cars in the fleet	**Share of electric cars in car-sharing fleet**	50% of electric cars in the car-sharing fleet by 2030	%	+	+	++
122	Reduce accidents involving rental scooters	**Number of accidents involving rental scooters**	Reduce scooter-related accidents by 30% by 2030	number	+	+	++
123	Decrease accidents involving rental cars	**Number of accidents involving rental cars**	Decrease rental car accidents by 20% by 2030	number	+	+	+++

Urban logistics plays a critical role in the urban mobility system. Its efficient management is essential for ensuring the smooth flow of goods and products within urban areas, which is particularly important given the growing volume of e-commerce orders and the increasing popularity of home deliveries for food and groceries. In the context of sustainable development, it is crucial that freight transport in urban spaces is carried out with minimal external costs. The KPIs presented in Table of indicators 6-7 are primarily focused on achieving this objective.

Table of indicators 6 Proposed Key Performance Indicators for Very Small, Small, and Medium-sized Cities (City Logistics)

City Logistics (local) light freight transport, first and last-mile logistics							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
124	Increase cargo bike rentals	**Number of cargo bike rentals per year**	Achieve 10,000 cargo bike rentals per year by 2030	number	+	+	++
125	Increase the use of municipal e-cargo bikes	**Number of rentals of municipal e-cargo bike**	Increase municipal e-cargo bike rentals to 5,000 annually by 2030	number	+	+	++
126	Reduce kilometres driven by municipal cars and trucks	**Total kilometers driven by passenger cars and light trucks within the municipal group**	Reduce total kilometres driven by municipal vehicles by 20% by 2030	km	++	+ +	+++

City Logistics (local) light freight transport, first and last-mile logistics							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
127	Decrease the number of municipal cars and trucks	**Number of passenger cars and light trucks within the municipal group**	Reduce the number of passenger cars and light trucks in the municipal fleet by 15% by 2030	number	++	++	+++
128	Increase the use of shared cargo bikes	**Average annual mileage of a shared cargo bike**	Increase the average annual mileage of shared cargo bikes to 3,000 km per bike by 2030	km	++	++	++
129	Expand urban logistics solutions in more districts	**Number of districts that implemented solutions for urban logistics**	Implement urban logistics solutions in 50% of districts by 2030	number	+	+	++
130	Increase the number of cargo bike terminals	**Number of cargo bike terminals**	Build 10 cargo bike terminals in key urban areas by 2030	number	+	+	++
131	Encourage more businesses to adopt fleet management	**Number of businesses with corporate mobility and fleet management**	Increase the number of businesses with corporate mobility and fleet management programs by 25% by 2030	number	+	+	++
132	Increase the number of cargo bikes in use	**Number of cargo bikes**	Increase the number of cargo bikes used for urban logistics to 500 by 2030	number	+	+	+++
133	Expand the number of CityHubs for deliveries	**Number of CityHubs**	Establish 5 new CityHubs for last-mile deliveries by 2030	number	+	+	++
134	Add more parking slots for goods delivery	**Number of parking slots dedicated to goods delivery**	Increase the number of dedicated parking slots for goods delivery by 20% by 2030	number	+	+	++
135	Increase the share of electric and hydrogen vehicles in the fleet of logistics companies	**Share of zero-emission vehicles in the fleet of logistics companies (electric, hydrogen)**	Reach 40% zero-emission vehicles (electric and hydrogen) in the municipal fleet by 2030	%	++	++	+++
136	Increase the share of LNG and hybrid vehicles in the fleet of logistics companies	**Share of zero-emission vehicles in the fleet of logistics companies (LNG, hybrid)**	Ensure that 30% of the fleet consists of LNG and hybrid vehicles by 2030	%	++	++	+++
137	Develop more Sustainable Urban Logistic Plans (SULPs)	**Number of elaborated SULPs (Sustainable Urban Logistic Plans)**	Develop and implement 2 new Sustainable Urban Logistic Plans (SULPs) by 2030	number	+	+	++

Table of indicators 7 Proposed Key Performance Indicators for Very Small, Small, and Medium-sized Cities (Heavy Freight Transport)

Heavy Freight Transport							
	Objective	**KPI**	**Example of target**	**Unit of measure**	**Very small city**	**Small city**	**Medium city**
138	Increase the use of sustainable transport modes (rail and sea) for freight at the port, reducing reliance on road transport	**Modal Split at Port**	Increase the share of freight transported by sustainable modes (rail and sea) to 50% of total port operations by 2030	%	++	++	+++
139	Increase the share of cargo being transported by railway to reduce road congestion and emissions	**Freight transported by railway / total cargo**	Achieve 40% of total cargo being transported by railway by 2030	%	+	+	++
140	Encourage transport companies to adopt more zero-emission trucks	**Share of zero-emission trucks (electric, hydrogen) in transport company fleets**	Increase the share of low-emission trucks (electric, hydrogen) in transport fleets to 50% by 2030	%	++	++	+++
141	Encourage transport companies to adopt more low-emission trucks (LNG, hybrid)	**Share of low-emission trucks (LNG, hybrid) in transport companies' fleets**	Increase the share of low-emission trucks (LNG, hybrid) in transport fleets to 50% by 2030	%	++	++	+++

3. Testing and validating the framework

Drafting the M&E framework for sustainable urban mobility planning for local authorities will form a starting point for the subsequent activities foreseen in the SUMPS for BSR project. These include testing and validating the M&E framework for selected pilots and testing different data collection methods for active modes. Local monitoring and evaluation plans will be prepared and supported with a careful selection of indicators.

The actions undertaken will also aim to ensure that the M&E framework remains sufficiently flexible to be applicable across a broad range of cities, while simultaneously being specific enough to accurately reflect the current conditions of transport systems and address the most critical issues. The framework's adaptability is intended to maximize its usability, allowing various municipalities to implement and benefit from its guidelines.

4. Appendices

Appendix 1: Sources of knowledge and ideas on monitoring and evaluation within SUMPs

- EGUM Opinion on The Sustainable Urban Mobility Indicators Best practice on monitoring SUMP implementation, especially on defining and applying sustainable urban mobility indicators and data collection
  https://www.mdlpa.ro/uploads/articole/attachments/66cc6cf55512c557923115.pdf
- EU good practices on sustainable mobility planning and SUMP https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1522246472.pdf
- CH4LLENGE SUMP Monitoring and Evaluation Manual
  http://www.sump-challenges.eu/kits
- SUMPs-Up project Manuals on SUMP Measure Selection
  https://sumps-up.eu/publications-and-reports/
- European Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan.
  https://sump-central.eu/tools-resources/sump-guidance/
- SUMP Guidelines and Decision Makers Summary
  https://urban-mobility-observatory.transport.ec.europa.eu/sustainable-urban-mobility-plans/sump-guidelines-and-decision-makers-summary_en
- Sustainable Urban Mobility Planning in Smaller Cities and Towns
  https://urban-mobility-observatory.transport.ec.europa.eu/document/download/0df8de32-7df7-48f4-b3fe-a248df964fdf_en?filename=sumps_smaller_cities_and_towns.pdf
- Strengthening SUMP monitoring: Best practices and pilot initiatives across Europe
  https://urban-mobility-observatory.transport.ec.europa.eu/news-events/news/strengthening-sump-monitoring-best-practices-and-pilot-initiatives-across-europe-2024-08-30_en
- Monitoring and evaluation Assessing the impact of measures and evaluating mobility planning processes
  https://www.ubc-sustainable.net/sites/default/files/publications/sump-manual_monitoring-evaluation_en.pdf
- Measure selection Selecting the most effective packages of measures for Sustainable Urban Mobility Plans
  http://www.sump-challenges.eu/content/measure-selection
- SUMP Self-Assessment
  https://www.sump-assessment.eu/English/start
- City-level SUMP monitoring and impact evaluation
  https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5bcd09eeb&appId=PPGMS

Appendix 2: List of Documents

Gävle

- Översiktsplan Gävle kommun 2030, Gävle 2017
- Miljöstrategiskt program 2.0 För Gävle kommunkoncern, invånare och näringsliv i Gävle, Gavle 2020
- Klimatkontrakt Gävle 2030, version 2023
- Energiplan för Gävle kommun 2022-2026
- Program Energy Optimized Port Cluster 2030
- Miljobokslut Gavle Kommun 2023

Greifswald

- Landesraumentwicklungsprogramm Mecklenburg-Vorpommern 2016. Ministerium fur Energie, Infrastruktur und Landesentwicklung Mecklenburg-Vorpommner, Schwerin 2016
- Stadtentwicklungsbericht 2023 der Universitäts- Und Hansestadt Greifswald - Sachstand zum ISEK Greifswald 2030plus. Greifswald 2023
- Integriertes Klimaschutzkonzept der Universitäts- und Hansestadt Greifswald. Dreseden – Garching – Greifswald 2010
- Masterplan 100% Klimaschutz Universitäts- und Hansestadt Greifswald Endbericht
- Städteranking. ADFC Fahhradklima-Test. ADFC, Bundesministerium für Digitales und Verkehr, 2023
- Kommunale Nachhaltigkeitsstrategie der Universitäts- und Hansestadt Greifswald KommNach HGW Zeitraum: 2022 – 2030, Greifswald, Greifswald 2020
- Integriertes Stadtentwicklungskonzept, Greifswald 2017
- Kombiniert mobil - Verkehrsmittel vernetzen Ministerium für Energie, Infrastruktur und Landesentwicklung. Universitäts- und Hansestadt Greifswald, Endbericht, Berlin – Greifswald 2015
- Masterplan 100% Klimaschutz Universitäts- und Hansestadt Greifswald 2017
- Kombiniert mobil - Verkehrsmittel vernetzen Ministerium für Energie, Infrastruktur und Landesentwicklung. Universitäts- und Hansestadt Greifswald, Endbericht, Berlin – Greifswald 2015
- Verkehrskonzept Innenstadt. Bericht, Greifswald, Oktober 2021

Gdynia

- Sustainable Urban Mobility Plan for the Metropolitan Area of Gdansk-Gdynia and Sopot, Gdansk-Gdynia 2023
- Strategy of Gdynia Development - Gdynia 2030, Gdynia 2017
- Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego Gdyni [Spatial Masterplan of the City of Gdynia]; Biuletyn Informacji Publicznej: Gdynia, Poland, 2019
- Plan adaptacji miasta Gdyni do zmian klimatu do roku 2030 [Adaptation plan for the city of Gdynia to climate change by 2030]. Gdynia City Office 2024
- Plan Zrównoważonej Mobilności Miejskiej dla Gdyni [Sustainable Urban Mobility Plan for Gdynia]. Gdynia 2016
- Sustainable Urban Mobility Plan for Chwarzno-Wiczlino district. Gdynia City Office 2020,
- The Cycling Strategy of Gdynia City 2030. Gdynia City Office 2023

Cesis

- Cesu Novada Ilgstpejigas Attistibas Strategija 2022-2036. Cesis 2022
- Aptauja Cesu novada skolenu vecakiem par izglitibas un mobilitates jautajumiem. Cesu novada izglitibas parvalde, April 2023

Panevėžys

- Spaces4people Panevėžys City Integrated Action Plan. Parengta projekto „Erdvės žmonėms“ metu, Panevezys, May 2022
- Tvarios Panevėžio miesto plėtros strategija (Sustainable Panevėžys City Development Strategy), Panevezys 2023
- Panevėžio miesto tvarios energetikos ir kovos su klimato kaita veiksmų planas (City of Panevezys action plan for sustainable energy and fighting climate change), Panevezys 2021
- The Action Plan for Sustainable Energy and Climate Action. Panevezys, July 2021
- National Energy and Climate Action Plan of the Republic of Lithuania for 2021-2030
- Sustainable Urban Mobility Plan for Panevėžys, Panevėžys 2018
- Panevėžys Strategic Development Plan 2021-2027, Panevėžys 2021

Turku

- Scandinavian Mediterranean. Fifth Work Plan of the European Coordinator
- Turku City Centre. General Plan 2029, City of Turku 2018
- The Implementation of the 2030 Agenda for Sustainable Development in the City of Turku. City of Turku 2020
- Circular Turku. A Roadmap Toward Resource Wisdom. City of Turku 2021
- Turku Climate Plan 2029. The City of Turku Sustainable Energy and Climate Action Plan 2029. Turku City Council, June 2018
- Climate City Contract. 2030 Climate Neutrality Action Plan. 2030 Climate Neutrality Action Plan of the City of Turku. NetZero Cities 2024
- City of Turku’s Development Programme for Pedestrian and Leisure Areas 2029. City of Turku 2022

Appendix 3: Questionnaire for City Bus Drivers

1) Please indicate the biggest challenges in the daily work of a bus driver within the city (maximum 3):
Heavy traffic
Rudeness from other drivers
Reckless driving by other drivers
Rudeness from passengers
Difficulty merging from bus bays
Having to sell tickets to passengers
Late working hours
Irregular working hours
Other, please specify: .....

2) Is there a bus line that is particularly challenging to operate?
NO / YES (which one and why) .....

.....

3) In your opinion, is there any bus stop that needs reorganization, changes in traffic management, or is particularly problematic for another reason?
NO / YES (which one, why, and what changes should be made) .....

.....

4) In your opinion, is there any road section that poses problems for driving a city bus?
NO / YES (which one, why, and what changes should be made) .....

.....

5) In your opinion, is there any street intersection that is particularly problematic for driving a city bus?
NO / YES (which one and why) .....

.....

6) Do you notice any intersections where traffic light changes are needed?
NO / YES (which one and why) .....

.....

7) Do you see a need for changes at Plac Konstytucji (the area in front of Gdynia Główna train station)?
NO / YES (what changes and why) .....

.....

8) In your opinion, are there any bus lines where it would be justified to replace a maxi-class bus (12 m) with a mega-class bus (18 m)?
Line: .....
Direction: .....
Time of day (hours): .....

9) Do you think bus lanes should continue to be introduced in Gdynia? If yes, which road sections should be prioritized for new bus lanes?
Street: .....

10) What change in the bus transport offer, in your opinion, would most encourage people to use buses for urban travel within the city? (please select 1)

- I don’t know / no opinion
- Changes to bus routes
- Changes to timetables (departure times)
- Increased service frequency
- Better integration with other transport systems (e.g., SKM)
- Lower ticket prices
- Introduction of new buses
- Introduction of new bus lines
- Other, please specify: .....

11) Which element of the current bus transport offer, in your opinion, most discourages passengers from using buses for urban travel within the city? (please select 1)

I don’t know / no opinion
Ticket prices are too high
Non-optimal bus routes
Non-optimal timetables (departure times)
Low service frequency
Delays
Uncertainty if the service will run
Travel time is too long
Transfer conditions
Level of integration with other transport systems (e.g., SKM)
Condition of the bus fleet
Other, please specify: .....

Appendix 4: Questionnaire for Office Complexes

Where do you commute to work from (Municipality, District)?

.....

How many days a week do you work on-site?

0-7

How many days a week do you work remotely?

0-7

How many minutes per day on average, during the warm season (April-September), does your one-way commute to work take using the modes of transport and/or methods of travel that you use?

Private car (driving alone in your own car)
Private car (shared with a colleague, known as
Private car (carsharing, e.g., Traficar)
Private car (being driven by a family member / someone
from the same household)
Walking
Bicycle/scooter, etc.
Public transportation (bus, trolleybus, etc.)
Intercity bus
Train

How many minutes per day on average, during the cold season (October-March), does your one-way commute to work take using the modes of transport and/or methods of travel that you use?

Private car (driving alone in your own car)
Private car (shared with a colleague, known as
Private car (carsharing, e.g., Traficar)
Private car (being driven by a family member / someone
from the same household)
Walking
Bicycle/scooter, etc.
Public transportation (bus, trolleybus, etc.)
Intercity bus
Train

How many kilometers do you travel one way when commuting to work? Which aspect of the public transportation service, in your opinion, requires the most improvement? (max 3)

I don\'t know what the current public transportation service looks like
Frequency of connections
None / No opinion
The ability to travel without transfers
A single unified ticket for all types of public transport
Coordination of connections between different modes of transport
Availability of seats / Lack of overcrowding in vehicles
Cleanliness of passenger spaces in vehicles
Vehicle fleet emissions
Technical condition of the vehicle fleet
Introduction of new routes
Location of stops
Travel time

Reliability
Punctuality
Other

Did your most recent job change involve a change in your commuting method? (e.g., from primarily using a private car to primarily using public transport)
Yes
No
My current job is my first one

Why did your most recent job change involve a change in your commuting method? (optional response) .....
How would you rate your knowledge of the public transportation services? (From 1 "I know nothing – I don't know where the stops are, which routes get me to my destination, or what tickets are available and how much they cost" to 5 "I have extensive knowledge – I know where all the stops of interest to me are, I know the routes and schedules, as well as what tickets are available, their prices, and where to purchase them")
1-5

How would you rate the following components of the bus and trolleybus service in city? (in the context of commuting to work)

	Very bad	Bad	Neither good nor bad	Good	Very good
Ticket prices					
Travel time					
Ride comfort					
Frequency of service					
Overall rating					

How would you rate the following components of the railway service? (in the context of commuting to work)

	Very bad	Bad	Neither good nor bad	Good	Very good
Ticket prices					
Travel time					
Ride comfort					
Frequency of service					
Overall rating					

How would you rate the conditions for walking during your commute to and from work?
Very good, Good, Neither good nor bad, Bad, Very bad

How would you rate the conditions for cycling during your commute to and from work?
Very good, Good, Neither good nor bad, Bad, Very bad

Do you believe that employer initiatives encouraging carpooling (i.e., encouraging employees commuting from the same areas to share rides to work in one car) could increase the use of this form of transportation?

Definitely yes, Rather yes, No opinion, Rather no, Definitely no

Which of the following actions aimed at promoting the idea of carpooling, in your opinion, could be the most effective?
Promotion of carpooling platforms
Appointing \"carpooling ambassadors\"
Financial incentives/rewards for people who carpool
Designating parking spaces for carpoolers
Other

Please indicate the bus/trolleybus lines in city whose schedules, in your opinion, require adjustments to improve your commuting conditions to and from work.
.....

Please indicate any other actions/changes in the transportation system that, in your opinion, would significantly improve your commute to and from work.
.....

To what extent has the shift to hybrid/remote work affected your use of a private car for urban travel?
I did not use a private car before, and I still do not use one.
I have significantly increased my annual mileage (by more than 25%).
I have slightly increased my annual mileage (up to 25%).
I have slightly decreased my annual mileage (by up to 25%).
I have significantly decreased my annual mileage (by more than 25%).
I used to use a private car, but I have completely given up owning one.

Would returning to full-time on-site work lead you to revert to your previous transportation behaviors (methods of commuting to and from work)?
Definitely yes, Rather yes, I don’t know, Rather no, Definitely no

How many private cars do you and the people you live with own in total?
.....

What is the main reason for not having a private car in your household? (for How many bicycles do you and the people you live with own in total?
.....

Appendix 5: The education sector as one of the potential sources of data on urban mobility

Educational institutions are a significant component of the local labour market, particularly in smaller or less diverse economies. The social infrastructure of schools and preschools should also benefit local residents. From the perspective of urban mobility, educational institutions are among the most important destinations for daily, regular trips, typically occurring at set times during the day (Nosal, 2016, p. 3-11).

The education sector is a major traffic generator, regardless of city size. Its role in local urban mobility is determined by:

- the scale of daily movements,
- the fixed starting or ending points of trips,
- time concentration, especially during the morning peak,
- distinct travel patterns depending on the type of school,
- a high share of pedestrian trips (in primary schools) and public transport usage (in secondary schools),
- seasonality.

The stakeholders in the education sector are highly diverse. Besides students of different ages (and varying levels of independence in making decisions about their mode of travel), this group includes parents and guardians, teachers, other staff employed in schools/preschools, as well as other individuals who use the school infrastructure (e.g., members of sports clubs, those participating in training sessions). Such a large diversity of stakeholders poses a challenge for conducting comprehensive actions in managing urban mobility (Table 5).

Table 5 Typology of stakeholders relevant to shaping urban mobility in the education sector

Entities in the Education Sector	Size	Transportation Behaviors	Scope of Decision-Making
Preschool and primary school students	Large	Travel to and from educational institutions	No independence in decision-making or executing trips
Other students	Very large	Travel to and from educational institutions	Varies depending on age and the school's location in relation to the place of residence
Principals	Minimal	Travel to and from educational institutions	Decisions about shaping the immediate surroundings of the educational institution
Teachers	Medium	Travel to and from educational institutions	Choice of transportation mode. Influence on students' and guardians' attitudes and behaviours regarding mobility
Other staff	Medium	Travel to and from educational institutions	Choice of transportation mode for commuting to school
Parents and guardians	Large	Travel to and from educational institutions, often "on the way" to/from work	School choice, transportation mode choice, decision about the child's independent travel to and from school

Local government administration	N.a.	Not applicable	Educational and promotional campaigns, funding changes near the school
Local government authorities	N.a.	Not applicable	Creating frameworks for urban mobility policy

The traffic patterns of a local government unit are strongly influenced by the daily movements of students, parents, staff, and other "users" of educational institutions. These patterns depend on the number and distribution of preschools and schools, designated school districts, the number and age of students, the types of schools, and the significance and popularity of a given school.

Student travel to and from schools represents a significant component of the demand in the urban mobility market. School-related traffic, in fact, accounts for about 15% of total urban traffic. Research conducted in various EU countries shows that the percentage of children driving to school by car ranges from 30% to 60%, depending on the country and school grade (Gävle Kommun 2019). An analysis of studies conducted in many cities across Poland shows that, apart from working adults, students are the largest group using public transportation services, as their travel times coincide with school start and end times (Hebel, 2013, p.178).

The following characteristics define school-related travel as a distinct segment of the urban mobility market (Wołek, 2017):

- Large scale of travel: While travel to preschools and primary schools is primarily local, in rural areas, the catchment area of a primary school is generally much larger than in cities.
- High travel obligation: This results from compulsory education.
- Regularity: School-related trips are consistent and predictable.
- High directness of travel purposes: Morning trips are usually directly to school.
- Concentration at specific times of day: There is a very pronounced morning peak, with a higher share of trips in the morning compared to the general population, and the afternoon peak occurs earlier than for the overall population (Figure 12).

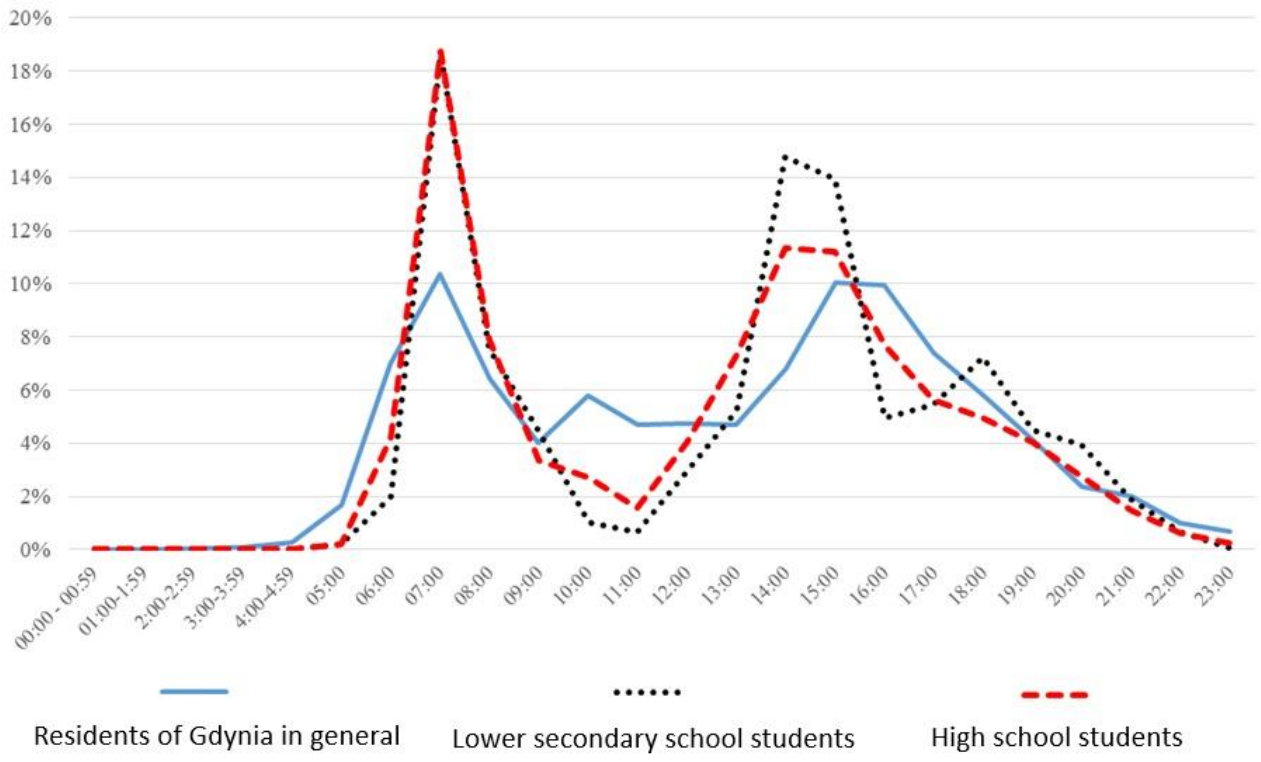

Figure 12 The daily schedule of non-pedestrian trips by start time for Gdynia residents, middle school students, and high school students in 2013 and 2014 [Gdynia residents – 2013, students – 2014].

Source: Preferencje i zachowania komunikacyjne mieszkańców Gdyni. raport z badań marketingowych 2013 (Preferences and communication behaviors of Gdynia's residents. Marketing Research Report 2013) ZKM Gdynia, Gdynia 2014. M. Konarski, O. Wyszomirski: Preferencje i zachowania komunikacyjne uczniów liceów ogólnokształcących w Gdyni i Sopocie. (The preferences and travel behaviour of students attending high schools in Gdynia and Sopot.) „Autobusy: Technika, Eksploatacja, Systemy Transportowe" 2015 nr 12, B. Orzechowski, O. Wyszomirski: Preferencje i zachowania komunikacyjne w podróżach miejskich uczniów gimnazjów w Gdyni. (The preferences and travel behaviour of students attending middle schools in Gdynia) Study as part of the CIVITAS DYN@MO project*, Uniwersytet Gdański, Gdynia-Sopot 2015*

The differences described above cause a distinctly different travel distribution motivated by education. There is a significantly higher share of pedestrian and public transport trips, while trips made by car are considerably lower (Figure 12).

The diversity in transportation modes related to education stems, on the one hand, from the existence of school districts in primary education and, on the other hand, from the specialisation of secondary schools. In the case of primary schools, pedestrian trips dominate, followed to a lesser extent by public transport and cycling. The car is increasingly used to drive children to primary schools, often combined with the parent's commute to work.

This specific travel pattern creates different requirements for the components of sustainable urban mobility. Table 7 presents their relevance to the education sector. The most important elements in this context include non-motorized transport, public transport, road safety, intermodality, the implementation of new usage patterns, and mobility management.

Table 6 The importance of sustainable urban mobility elements for the education sector

Element	Importance
Public transport	high
Active mobility	
intermodality	
Traffic safety	
New mobility patterns	
Mobility management	
Promotion of clean vehicles	medium
Road transport	
Inteligent transport systems	
Urban logistics	low

Low-Cost Methods for Investigating Mobility in the Education Sector

Comprehensive traffic studies are the most effective way to understand the mobility of the education sector. However, it is difficult to conclude the scale and structure of this phenomenon across the entire country, as these studies are often limited to a few medium and large cities. Additionally, some studies focus only on students over the age of 12, which distorts information regarding the scale and structure of demand in this segment of the urban mobility market.

Given the limitations of current studies, there is a clear need for comprehensive research on mobility preferences and behaviors in the education sector at the local level. These studies, which can be conducted at a low cost, are crucial for implementing effective measures to shape urban mobility. Such measures could include improving road safety, promoting non-motorized transport, and enhancing public transportation services.

When it is necessary to gather important information about mobility in the education sector quickly, a compromise solution is to collect data from school principals. The information gathered could include:

- the modal split of travel for students and school staff (Figure 13),
- identification of accessibility issues,
- road safety concerns,
- adjustment of public transportation schedules to meet the needs of students and staff,
- barriers to pedestrian and bicycle traffic.
- The main research methods used for research among school principals are presented in Table 8. Furthermore, Appendix 6 provides an example of a questionnaire, which can be employed, either in its entirety or partially, to gather data on the mobility patterns of students and school staff, as well as to identify key challenges related to the condition of infrastructure, public transport availability, and traffic management in the areas surrounding educational institutions.

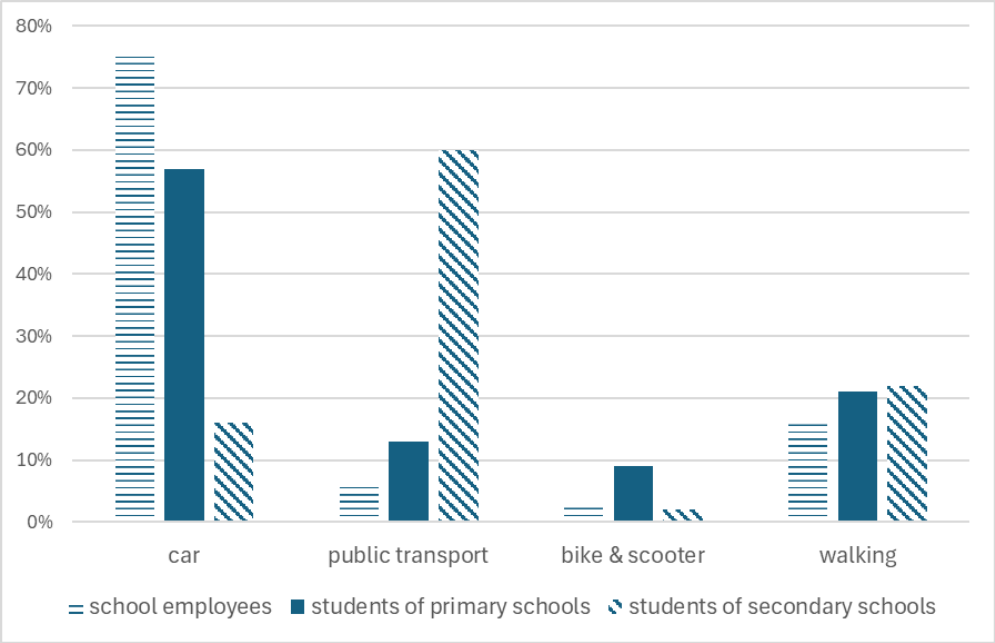

Figure 13 The exemplary modal split of school employees of one of the Polish Functional Urban Areas based on research conducted in one of the Polish Functional Urban Areas, September 2024

Table 7 The main research methods for low-cost research among school principals based on Richardson et al. (2003)

Research method	Description of method	Usefulness for the research on mobility issues in the education sector
Observation	The observer conducts observations at a predetermined measurement point or points. The method includes simple counting.	Identifying the number of bicycles and scooters parked on the school premises allows for a precise determination of the bicycle share in the modal split. The season of the year significantly impacts the results.
Personal interview	Orientated to penetrating below the superficial question-and-answer format of structured or semi-structured personal interviews.	An individual interview helps identify the school's biggest mobility-related problems, such as low cyclist safety, poor alignment of the bus schedule with the class timetable, or Inappropriate driver behavior near schools, such as excessive speeding, parking in unauthorized areas, and similar actions.
Focus group interview	A small group of people brought together and guided by a moderator through a discussion about a defined topic.	This method allows for interaction between representatives of different schools and the development of joint conclusions covering the education sector of the entire city or functional area. It also enables the preliminary prioritisation of the identified problems' significance.

Appendix 6: Education Sector Study – Questionnaire for School Principals

Please provide the number of:
Students from the municipality where the school is located: ……
Students from outside the municipality where the school is located: ……
Teachers and technical staff: ……

Please provide the number of bicycles, scooters, and mopeds that students used to arrive at school (after the start of morning classes):
Number of bicycles: …… ,
number of scooters: ……..,
number of mopeds: ……..

Please estimate the number of staff (teachers and technical staff) who most frequently travel to school by:
Private car: ……
Public transport: ……
Bicycle / scooter / rollerblades, etc.: ……
On foot: ……

Please estimate the percentage of students who travel to your school using (the answers should total 100%):
Private car: ……
Public transport: ……
Bicycle / scooter / rollerblades, etc.: ……
On foot: ……

Please rate on a school scale (from 1- insufficient, to 6- excellent) the following factors important for the mobility of your school's students and staff:

Factor	1 insufficient	2	3	4	5	6 excellent	Not applicable
Timing of bus arrivals aligned with the school schedule							
Timing of bus departures aligned with the school schedule							
Number of bus connections							
Bus routes aligned with the place of residence of students/staff							
Sufficient number of car parking spaces							
Sufficient number of bicycle and scooter parking spaces							
Pedestrian safety in the immediate vicinity of the school							

Quality of pedestrian infrastructure providing access to the school							
Cyclist safety in the immediate vicinity of the school							
Quality of cycling infrastructure providing access to the school							
Location of public transport stops in relation to the school							
Equipment of public transport stops (e.g., shelters, timetables, benches, etc.)							

Please provide the current number of:
Parking spaces located on your school's premises: ……
Bicycle racks located on your school's premises: …… (including covered racks: ……).
How many bicycles can be parked at your school's racks? ……

By how much do you plan to increase the number of parking spaces and bicycle racks over the next 3 years (0 = no plans to increase):
Parking spaces: ……
Bicycle racks: ……

Please assess the direction of changes in transport options for accessing your school over the past 5 years:

Transport element	Significantly worsened	Worsened	Unchanged	Improved	Significantly improved	Not applicable
Public transport offer						
Traffic safety conditions						
Pedestrian infrastructure						
Cycling infrastructure						
Road infrastructure						

Is your school involved in initiatives aimed at encouraging students to travel by public transport?
A. Yes, which: ……
B. No

Is your school involved in initiatives aimed at encouraging students to travel by bicycle/scooter?
A. Yes, which: ……
B. No

Is your school involved in initiatives aimed at encouraging students to walk to and from school?

A. Yes, which: ……
B. No

Is your school involved in initiatives aimed at improving road safety?
A. Yes, which: ……
B. No

What potential actions, in your opinion, would most improve the conditions for traveling to or from your school?
……

Appendix 7: Urban Mobility Questionnaire for City Residents

How long have you lived in the city?

I don't live here (thank you for your participation)
Less than a year
1-5 years
6-10 years
More than 10 years
My whole life

How do you most frequently travel around the city?

On foot
By bicycle
By private car
By public transport
By motorcycle/scooter
Other, please specify: _____

Please evaluate whether you currently travel around the city more or less compared to the pre-pandemic period (relative to 2020).

Mode of travel	Much less	Somewhat less	About the same	Somewhat more	Much more	Not at all (currently and in 2020)
travel on foot						
travel by private car						
travel by public transport						
travel by bicycle						

Traveling on foot in the city is:

Statement	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
Pleasant				
The fastest of all options				
Safe				
Inconvenient due to the condition of sidewalks				
Inconvenient due to the lack of adequate pedestrian crossings				

To what extent do you agree or disagree with the following statements about the current conditions for cycling in the city:

Statement	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
The bike lanes allow me to reach my key destinations				
The number of bike racks is sufficient				
I feel safe while cycling				

Would you be willing to use the following sustainable forms of transport more often if their quality were improved (e.g., new sidewalks, bike lanes, or increased frequency of public transport services)?

Statement	Strongly no	Somewhat no	Somewhat yes	Strongly yes
Walking trips				
Bicycle trips				
Public transport				

What changes in public transport in the city would be most important for you?

None, nothing would make me use public transport
None, the current public transport offering is optimal for me
Improvement in punctuality
Increased frequency
Improvement in direct routes
Better integration of lines
Lower ticket prices
Improved travel comfort (newer vehicles)
Other, please specify: _____

Which area or aspect of city transport, in your opinion, requires particular attention and improvement?

.....

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