

Article

Key Challenges in the Status Analysis for the Sustainable Urban Mobility Plan in Podgorica, Montenegro

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Abstract: The paper presents the results of the application of a practical approach for collecting data, which provides a simple, cost efficient, and easily reproducible method that was applied to obtain the necessary data for the status analysis of the Sustainable Urban Mobility Plan (SUMP) for Podgorica, the capital of Montenegro. Important data for the estimation of the existing condition of the traffic system were collected through desk research from the appropriate institutions and organizations. Several surveys and focus group interviews were conducted, in which about 5000 residents of Podgorica participated. In addition to answering questions, residents made numerous suggestions, confirming the correctness of a participatory approach in the new traffic planning paradigm that provides the SUMP with crucial advantages. A manual cordon count of traffic on five bridges for the traffic of the motor vehicles, as well as on two pedestrian-only bridges, was performed by students from the study program Road Traffic, and there are plans to repeat this in the coming years in order to enable more reliable monitoring and evaluation of the obtained data. Contemporary quality management tools such as BYPAD and ParkPAD were also used to assess the status of cycling and parking policy, respectively. It is especially important to emphasize that Podgorica is the first city in the West Balkans, and the fourth city in Europe, in which the ParkPAD tool was applied. A wide range of negative phenomena and trends was identified, like a rapid increase in the number of registered vehicles, an increase in the motorization rate and the number of traffic accidents, increased non-compliance with traffic rules, excessive use of passenger cars and auto-taxi vehicles, insufficient use of unattractive public transport, walking and cycling, etc. Based on the data collected, key challenges in status analysis in Podgorica were identified, which the SUMP should try to overcome.

Keywords: sustainability urban mobility plan (SUMP), urban planning; vehicles; parking; public transportation; walking; cycling



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1. Introduction

The transport sector plays a key role in the development of urban areas by providing people with easier and faster access to work, educational institutions, shops, restaurants, recreation and healthcare facilities, and other facilities where they meet their everyday needs. In recent decades, urban areas around the world, not only in developed but also in developing countries, have become increasingly occupied by motorized vehicles, and growth of their use from day by day is becoming less sustainable [1]. The increase in passenger and freight transport in urban areas causes many problems in terms of their sustainable development, such as CO₂ (carbon dioxide), NO₂ (nitrogen oxides), PM (particulate) emissions and noise (environmental problems), increased transport costs and losses in time caused by congestion (economic problems) and traffic accidents (health and social problems), etc. [2–4]. About 74% of all Europeans in 2018 lived in urban areas and this percentage is expected to increase over the coming decades [5]. Population growth

and the expansion of urban areas are increasing the demand for urban mobility, causing congestion, environmental, and social problems [6]. As a result, a large number of cities in the EU are facing serious environmental problems and a significant number of road accidents [6,7]. About 25% of greenhouse gas (GHG) emissions in Europe originate from the transport sector, and urban mobility is responsible for 23% of all transport-caused GHG emissions in the EU [6,8]. Forecasts show that these percentages will be doubled by 2050 in the case of a lack of appropriate strategic decisions and actions at all levels [2,9]. According to the European Commission's calculations, congestion costs in European cities amount to almost EUR 100 billion per year [2,10]. On the basis of the current trends, it is predicted that private car use will be the dominant form of urban mobility in the future. Therefore, the previously described environmental and social problems of the population in urban areas will be increasingly relevant [11–13].

Unfortunately, the existing state of urban mobility in most cities in developing countries is far from satisfactory. The most visible urban mobility problem in cities is traffic congestion, and it is well known that congestion has a significant negative impact on GDP. Most cities in developing countries have similar problems such as unaffordable and inaccessible public transport services and unsafe infrastructure for non-motorized transport. Private vehicles dominate roads and public space and their number is growing continuously. As a result of all these negative impacts, the transport sector bears significant responsibility for the health problems of the population in cities caused by air pollution (smog, acidification), noise, and traffic accidents. If transport functions poorly, it can slow economic growth and affect the efficient delivery of essential social services to the population. Especially in cities of developing countries, mobility for vulnerable groups is a very important issue. The cities with an integrated transport system are more likely to develop and prosper as centres for trade, industry, tourism, education, and other services. The best ranking cities of surveys measuring the urban quality of life have very well organized urban transport systems that prioritize public and non-motorized transport [14–17]. Lopez-Carreiro and Monzon [18], in their study, deal with evaluation of the solutions implemented within the strategic plans, with a focus on a set of so-called smartness indicators. Curiel-Esparca et al. [19] developed a methodology for the evaluation of sustainable mobility indicators related to health and air pollution (sustainability), travel quality, and economy. Cavalcanti et al. [20] selected a list of 17 indicators for assessing the sustainability of urban mobility projects. Between the selected indicators, there is also one that takes into account compliance local urban mobility plan with the master plan. Perra et al. [21] also identified indicators that take into account integrated planning. However, most indicators introduced in the literature for the assessment of the sustainable urban mobility plan do not take into account the stage of formulating a strategic plan in the field of sustainable transport (especially the scope of the cooperation with stakeholders and other local authorities), which, if properly developed, may affect the effective implementation of the strategy. However, most of the indicators noticed in the literature to evaluate the urban mobility strategy do not take into account the extent of cooperation with stakeholders and other local authorities, which, if properly developed, may help the successful implementation of the strategy [22].

Urbanization of space in cities requires the coordinated, sustainable, associated action of all stakeholders. The European Commission is supporting local authorities “so that all cities across the Union can achieve a step-change in their efforts for more competitive and resource-efficient urban mobility”, in its Communication on competitive and resource-efficient urban mobility [6,23]. As a result of previously described activities, there are numerous strategic documents containing long-term goals for urban mobility [2,24,25]. In the White Paper, specific targets for environmentally friendly transport in the urban areas were adopted [2,26]. As a result of growing interest in this issue at the European Union level, several projects have been financed (CIVITAS, CH4ALLENGE), in order to promote sustainable urban mobility. One of the key documents in line with these activities at the local level is a Sustainable Urban Mobility Plan (SUMP), which should integrate all

transport modes, interconnect all stakeholders, and improve quality of life in cities [2,27,28]. SUMP is an approach that has shown good results in many European cities [29]. It is a local strategic document that ideally plans for the complete functional urban area rather than only the administrative area of a single city, and that ideally requires cooperation between all principal stakeholders. Bearing in mind the numerous benefits of the adoption and implementation of this concept in the area of traffic planning, the European Commission has actively promoted it for several years [30–32]. The SUMP follows the principles of the overarching sustainable mobility paradigm whose purpose is “to design cities of such quality and at a suitable scale that people would not need to have a car” [33,34]. The new paradigm also promotes the new transport hierarchy [33–35] from which the SUMP takes its objectives of improving accessibility, traffic safety, and increasing the use of sustainable transport modes. The process of development and adoption of a new paradigm for sustainable urban mobility has been ongoing for the past thirty years [33,36]. The development of the new paradigm has been stimulated by the constant increase in the volume of motorized traffic and by its increasingly pronounced and numerous negative effects. On the one side, mobility has brought positive economic and social effects, such as exchange of people and goods, international collaboration, and a higher standard of life [33,37], but also negative aspects including a high proportion of urban land used for transport, congestion, fuel consumption, and environmental and social problems [33,35–39]. Furthermore, major negative aspects are mainly caused by excessive and very frequent unnecessary private car use [33,39]. Intensive use of the private cars has been proven to reduce the amount of physical activity and possibilities for social interaction among the population, increase the possibility of traffic accidents, and to have a negative impact on population health and the environment [33,40,41]. SUMP focuses on sustainable travel modes, especially active urban mobility (walking and cycling), which are characterized as the healthiest, least environmentally controversial, and most socially equitable and economically rational forms of mobility [42,43]. These advantages make active urban mobility “the most favorable mode in terms of sustainability” [44,45], and it is also supported and compatible with the other modern paradigms for creating green, healthy cities that are pleasant places to live in [33,46,47]. The previous concept of urban mobility planning where everything was subordinated to cars led to a deterioration in the life quality of humans, who were in the background, so that the new paradigm in planning aims to turn the process in a completely different direction, in which, after applying the new planning concept, everything is subordinated to humans or citizens, specifically their health and satisfaction with the quality of life in the city. A new global paradigm in the urban mobility planning now places much more focus on people instead of vehicles. This way of planning not only returns a healthy and satisfied citizen, but brings many benefits to the city and very often results in an increase in real estate prices.

During the process of researching the existing literature on the topic of the sustainable urban mobility plans, the authors have thoroughly investigated papers published in international databases. In addition, EU strategic documents were analyzed, such as White Paper: Roadmap to a Single European Transport Area—Towards a competitive and resource-efficient transport system [48]; A European Strategy for Low-Emission Mobility [49]; Together towards Competitive and Resource-Efficient Urban Mobility [50]; Action Plan on Urban Mobility [51]; and Green Paper: Towards a New Culture for Urban Mobility [52].

The capital of Montenegro, Podgorica, is an administrative, economic, cultural and academic centre, where more than a third of the state’s population lives (Figure 1). The last two decades have been marked by migration of the population from almost all other parts of Montenegro, especially from the north, to Podgorica, which has contributed to the city’s rapid development. Podgorica has invested significant funds into the development of traffic infrastructure to try to ensure that it continues to function in a situation of increased population and vehicle ownership. Transport planning in Podgorica has, until now, mainly

been focused on building more infrastructure for private cars with the goal of providing as much space as possible for driving and parking.

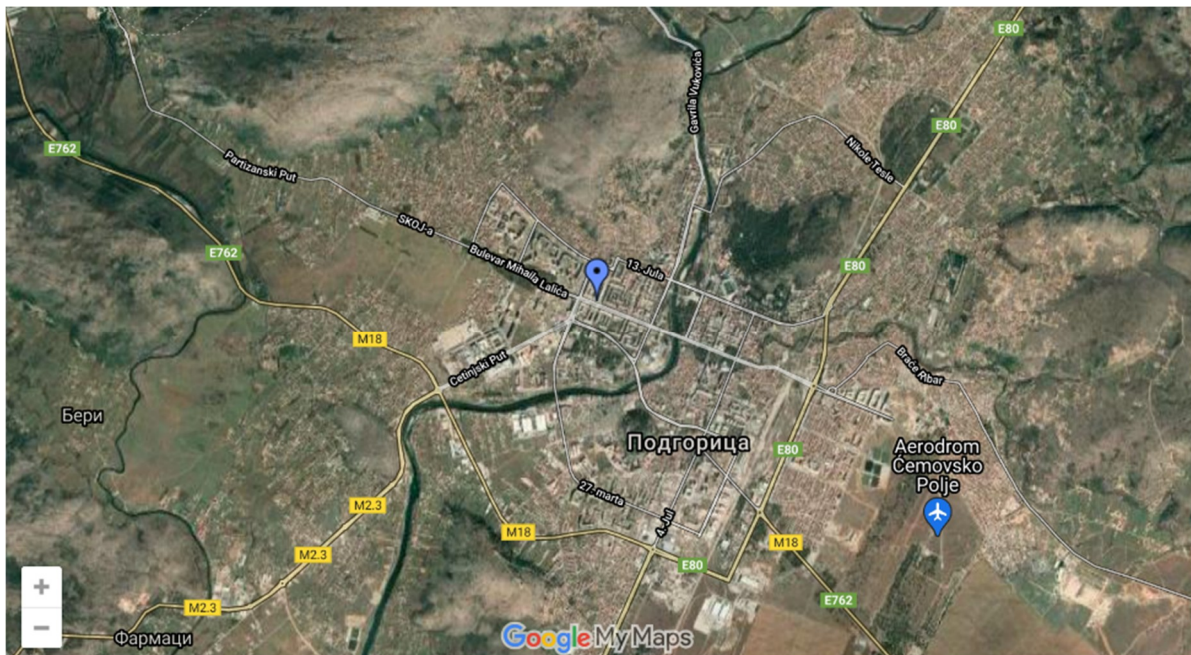


Figure 1. Map of the municipality of Podgorica (source of background picture: Google Maps) [53].

In Podgorica, the development of the SUMP has been completed and it was adopted on 24 February 2020 in the local parliament [53]. The development of the SUMP for Podgorica was implemented with the support of GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH)'s Open Regional Fund for Southeast Europe-Energy Efficiency (GIZ ORF-EE, the German Organisation for Overseas Cooperation), which aims to support cities in Southeast Europe in developing energy efficient and sustainable solutions for mobility.

The methodology of SUMP development includes several steps or phases [54,55]. The first step in Podgorica was completed in June 2019 and was related to defining the vision and strategic goals. The second step relates to the status analysis that is the subject of this paper. This phase in the process of SUMP development is very important because the selection of indicators and specific goals is done on the basis of the key challenges in the status analysis.

The paper presents the methodology used to collect the data necessary for the status analysis. Of great importance is the application of simple, cost-efficient and easily reproducible methods that can be used to monitor and evaluate selected indicators of the SUMP in the following years.

Based on the results obtained, key challenges in urban mobility in Podgorica were identified. The SUMP then provides a response to these challenges in the form of a set of measures given in the action plan, and it remains for the local government to take care of their implementation. The measures envisaged by the SUMP are not the subject of this paper.

2. Materials and Methods

According to the EU Guidelines on Sustainable Urban Mobility Planning [54,55], the most important step in SUMP preparation is to analyse the current state of urban mobility. The status analysis provides the basis for setting the specific objectives of the SUMP in a transparent way with the full involvement of citizens. As a second step in the process of SUMP development, a thorough identification and analysis of the problems and opportunities in the field of urban mobility is needed. However, experience in other cities

in the Balkans and further afield, where the authors of this paper have worked on other SUMP, indicates that this status analysis can absorb a very large amount of time and effort as technicians seek to obtain all possible data that they can think of, pertaining to the city's transport and spatial planning system, without necessarily considering the value of those data. Again based on the experience of the authors in their work with cities in the Balkans, is the observation that the process is often led by the data, rather than first considering what data need to be measured what the plan is intended to achieve.

The approach in Podgorica was somewhat different, because both time and resources were limited for plan preparation as a whole, but also because the municipality has limited resources for gathering such data so it was not considered helpful to gather very large amounts of data in the status analysis for the SUMP (a project funded externally to the city) if the city itself were not able to gather comparable follow up data in future to track the progress of the SUMP.

2.1. The Goal of the Research

The main goal of the research was to obtain key information about the current state of key indicators of the transport system such that the basic principles and key measures in the SUMP could be established. The paper presents the results of the status analysis before discussing the advantages and disadvantages of the approach taken to the status analysis, and its applicability to other similar cities.

2.2. Methodology of the Research

In the preparation and in the process of drafting a status analysis of the situation of traffic system in Podgorica, the following activities were carried out: a workshop to create a vision for the development of the city's traffic system; preparation of a wide range of indicators for monitoring and evaluation; review of a strategic documents and studies carried out by local government; and collection of existing data necessary for the development of the status analysis.

Collecting of the missing data for the quantification of indicators included the following activities: desk research—identification and collation of data that were already collected; survey of parents of children in kindergartens; survey of primary school pupils; survey of high school students; online survey of citizens; online cycling survey; discussions with focus groups; BYPAD analysis (bicycle policy audit); ParkPAD analysis (parking policy audit); and manual traffic counting.

The status analysis is therefore based on desk research of the strategic documents, studies, reports, and other official documents, and collecting data from institutions and organizations. In addition, for the purposes of preparing the status analysis for Podgorica, several surveys were conducted, including two online surveys as well as discussions with focus groups (parents, retirees and employees). The only survey that failed was the analysis of means of travel to work, organized to be completed by employees in a telecommunications company. The survey in question was conducted during the holidays, the response rate was unsatisfactory and the results obtained were unrealistically positive, so they were not considered in the status analysis.

During the SUMP development process, a survey was conducted of parents who bring their children to kindergartens, primary school pupils and secondary school students; the citizens were interviewed through an online questionnaire on the Podgorica website, while the Biciklo.me NGO also organized a survey entitled "Conditions for Cycling in Podgorica" for the purposes of the SUMP. In this way, about 5000 citizens of Podgorica contributed to the development of the SUMP (Table 1).

Table 1. Number of Podgorica citizens who participated in the process of developing the SUMP [53].

Survey	Number of Participants	Share in Relation to the Whole Sample
Parents of children in kindergartens	179	3.58%
Primary school pupils	2389	47.80%
Secondary school students	1577	31.55%
Citizens of the Podgorica (online)	309	6.18%
Biciklo.me NGO (online)	503	10.07%
Focus groups	41	0.82%
Total	4998	100.00%

The special quality of the status analysis was achieved thanks to the application of the BYPAD tool. BYPAD is a quality management tool focusing on city (or region) bicycle policy. The tool is used by trained auditors who facilitate the evaluation process. It consists of several pre-defined steps, such as group cycling tour, evaluation workshop, consensus meeting and action plan coordination. The process involves a group of city representatives, which consists of members of political leadership, management and users, who evaluate the current cycling policy in 9 different fields which support cycling. The result of the audit is a group consensus on the current situation, and an action plan which tries to address the key challenges identified by the whole group.

The ParkPAD tool follows a similar method but focuses on parking. It is a locally applied audit process that helps cities to review parking policies, achieve consensus on improvements and finally develop an action plan that fits the city's SUMP. The ParkPAD tool was applied in Podgorica for the first time in the Western Balkans and for the fourth time in Europe. Manual traffic counting was performed by students of the Faculty of Mechanical Engineering from the study program Road Traffic, as part of practical exercises in the subject Basics of Traffic Planning. This activity will be repeated by students each year at the same time, under the same conditions, for monitoring and evaluation of the effects of the measures on the modal split, identified by the status analysis. This approach, in addition to being free for local government, enables the education of staff on the topic of SUMP, who will be trained to work on the implementation and updating of SUMP, upon completion of their studies. Otherwise, the local government would spend financial resources through the public procurement procedure, with the possibility of selecting a new bidder for this activity every year, which would potentially disrupt the repetition of the original methodology and conditions under which the count was performed, and thus obtain data that would, in the assessment of monitoring and evaluation, have led to erroneous conclusions.

After conducting the aforementioned research, the data obtained were processed in order to identify key challenges for the sustainability of urban mobility of Podgorica. It was very important that the data collection methods used did not require significant financial resources, making them more easily reproducible compared to data gathered in more resource-intensive ways. Their reproducibility makes them a good basis for monitoring and evaluation of the effects of SUMP because their low cost means they can be collected regularly to identify trends.

For more effective development of the SUMP, a Working Group of five members was formed, consisting of experts employed in local administration and representatives of the non-governmental sector. Each member of the Working Group was responsible for one of the strategic pillars of the SUMP [53]:

1. Pillar I—Comprehensive planning for sustainable urban mobility;
2. Pillar II—More rational use of passenger cars;
3. Pillar III—Modernization and popularization of public urban transport;
4. Pillar IV—Valorisation of cycling potential;
5. Pillar V—Return to walking as the healthiest mode of mobility.

The process of developing the SUMP began in April 2019 and it is shown in Figure 2 in the form of a Gantt chart. The vision and strategic goals were adopted at a workshop held in June 2019. European Mobility Week in September 2019 was used to present the results of the status analysis. The time schedule for producing all SUMP phases was very close to the projected one, so that the first working version of SUMP was completed by the end of 2019. All participants contributed fully to complying with the planned time schedule.

SUMP ACTIVITY	MONTHS										
	1	2	3	4	5	6	7	8	9	10	11
Setup of Working Team	■	■									
Adoption of the Vision and Strategic Goals		■	■	■	■						
Developing of Status Analysis and Plan for Monitoring and Evaluation		■	■	■	■						
Developing Targets and Indicators						■					
Selection of Measures							■				
Developing of Working Version of SUMP								■			
Developing of Final Version of SUMP for Adoption									■		
Adoption of Final Version of SUMP										■	■

Figure 2. Process of Podgorica SUMP development.

Other stakeholders in this process, primarily citizens, as well as representatives of companies founded by the City, representatives of the Ministry of Transport and Maritime Affairs, representatives of NGOs, the Faculty of Mechanical Engineering of the University of Montenegro, and representatives of public urban transport operators, participated actively through all phases of SUMP development.

3. Results

During the desk research, valuable data were obtained on the current approach to traffic planning, demographic trends, financial resources invested in the improvement of road infrastructure, the number of registered vehicles and growth trends, the number of parking spaces and the number of traffic accidents. Care was taken to make all data and indicators that were not available through the proposed measures available in the SUMP action plan. The results of the desk research are given in the first six subchapters. The next three subchapters present the results of a survey of parents of children in kindergartens, primary school pupils and secondary school students. The tenth subchapter shows the results of the modal split obtained by manual traffic counting. The eleventh subchapter presents the results obtained by the survey of citizens' satisfaction with the state of the traffic system collected through an online survey published on the official website of the municipality of Podgorica. Data obtained through an online survey conducted by the Biciklo.me NGO and the results of focus group discussions were not presented in the paper because the results matched very well with the results given in subchapter eleven. The last two subchapters present the results obtained using BYPAD and ParkPAD tools.

3.1. Absence of Comprehensive and Integrated Transport Planning

A key finding related to transport planning is the lack of previous documents dedicated to strategic and integrated transport planning. In Podgorica, as well as in most Montenegrin municipalities, there has been no experience with comprehensive and integrated urban mobility planning so far. Although other strategic documents (dedicated to spatial planning, environment, energy or development) agree on the need for sustainable transport as an objective, no such document has been prepared so far. The topic is commonly addressed only in documents and measures lower in the planning hierarchy, as well as in everyday operational practice.

Previous urban mobility planning practices in Podgorica have been largely subordinated to the increase in the number of passenger cars. That is why investments and other spatial interventions have adapted to the cars in terms of space solutions, structure and transport infrastructure.

In the absence of an appropriate strategic document in the field of transport so far, Podgorica did not have adequate mechanisms in place to identify priorities in the field of transport and to evaluate measures related to these priorities. With the partial exception of the centre of the city, transport planning still focuses on increasing the capacity of transport infrastructure. The result is a significant investment in the budget for the construction of road infrastructure, which does not improve the situation, as there is a general opinion among citizens of Podgorica that they travel longer, spend more money on mobility and, due to traffic jams, losing more time compared to the past.

3.2. Demographic Trends

The research of official data obtained from MONSTAT shows that the population of Podgorica has increased by about a quarter in the last 18 years (24.1%) (Table 2). Unofficially, that percentage is significantly higher, because the last two decades have been marked by migration of the population from the northern and the rest of the central part of Montenegro to Podgorica, but a significant number of these new inhabitants have not formalized their change of residence. The evident increase in the number of inhabitants inevitably generates an increase in the number of registered vehicles and, consequently, leads to problems in the functioning of the traffic system.

Table 2. The number of citizens of Podgorica in the period from 2000–2018 [53].

	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018
Montenegro	604,950	609,828	613,353	615,025	616,969	619,428	620,601	621,810	622,303	622,227
Podgorica	160,918	164,688	166,814	171,799	175,314	181,549	187,911	192,225	195,718	199,715

3.3. Financial Framework

The local government, aware of the problem of unsatisfactory functioning of the traffic system, allocates substantial budget each year for improvement of the local road infrastructure and parking areas (Table 3). Roads are widening and parking areas are increasing, to the detriment of shrinking green spaces in the city. Despite the above, cars are very often parked on sidewalks and green areas.

Table 3. Investment in transport infrastructure in Podgorica, 2013–2018 [53].

	2013	2014	2015	2016	2017	2018	Total [€]
Investment in traffic infrastructure	6,304,901	8,121,157	7,362,268	8,594,366	9,188,268	10,765,080	57,583,543

3.4. Registered Vehicles

In the past two decades, Podgorica has seen a significant increase in population and an even more significant increase in the number of registered vehicles. One of the most important indicators monitored in the transport sector is the motorization rate, which represents the number of registered passenger cars per thousand citizens. The result of this key finding of the situation analysis quantifies the observation of every citizen of Podgorica that convoys of vehicles and traffic jams grow from year to year and increasingly impair the quality of life, threatening to become a serious limiting factor for further sustainable development of the city. Table 4 below shows data on registered vehicles.

Table 4. Data on registered vehicles in Podgorica [53].

Podgorica	2014	2015	2016	2017	2018	Growth Rate 2014–2018
Number of passenger cars	59,978	61,448	65,214	68,759	73,983	23.4%
Total registered vehicles in Podgorica	66,805	68,951	73,438	77,573	83,841	25.5%
Population number in Podgorica	192,225	194,022	195,718	197,589	199,715	3.9%
Motorization rate in Podgorica	312	317	333	347	370	18.6%
Total registered vehicles in Montenegro	196,059	198,772	209,098	219,378	235,385	20.0%
Number of first-time registered passenger cars in Podgorica	4815	5339	6145	7518	8486	76.2%
Total first-time registered vehicles in Podgorica	5530	6411	7366	8767	9895	78.9%

Based on the previous table, it can be seen that the number of registered passenger cars increased by 14,005 (23.4%) in the period 2014–2018, while the total number of registered vehicles increased by 17,036 (25.5%) [53]. In the same period, the number of registered vehicles in Montenegro increased by only 20%, so the record is an increase in the number of registered vehicles in Podgorica by 27.5% compared to the national average. In the observed period, the population of Podgorica increased by 3.9% and the motorization rate by 18.6%. Especially in the observed period, the growth rate of first-time registered passenger cars and the total number of first-time registered vehicles in Podgorica were 76.2% and 78.9%, respectively. All the above findings of the status analysis indicate a very pronounced trend of motorization of the population of Podgorica, which makes the development of SUMP increasingly justified, and the indicators presented in this paragraph deserve special attention throughout the process.

3.5. Parking

According to the records of parking areas in the territory of Podgorica in 2007, there were 14,361 parking spaces in total, while parking was charged for in 1244 parking spaces at that time. Currently, there are 5019 paid parking spaces operated by the city parking company (Parking Service Podgorica Ltd.) founded by the Capital City of Podgorica. The city parking company has five garages with a total of 697 parking spaces, 12 special parking lots with a total of 1237 parking spaces and 3085 parking spaces on-street in parking zones [53]. The status analysis concluded that there are no data on the total number of marked parking spaces on the streets, parking lots, underground garages of residential buildings, and other areas intended for parking in the territory of Podgorica—although such a lack of data is typical of many cities, not only those in the same region as Podgorica. It is obvious that a significant number of vehicles do not have their own parking space, so there are a significant number of illegally parked vehicles in the green spaces, sidewalks and areas designated for other purposes, not just at night, but also during the day.

3.6. Traffic Safety

Traffic safety is certainly one of the most important factors when it comes to the functioning of the traffic system. Considering its role and importance, this segment has been given a lot of attention. One of the priorities is to increase the level of traffic safety, reduce the number of deaths, the number of injuries and, in general, reduce the number of traffic accidents. Unfortunately, in spite of visible efforts, statistics show an upward trend. Traffic safety data for the territory covered by the Police Directorate-Security Center Podgorica have been processed and are given in the following tables:

Table 5 shows an increase in the total number of traffic accidents of 13.9% in just two years, and an increase of about 31.0% in the number of traffic accidents with injuries on the streets of Podgorica. In this way, through the desk research, a new key finding of the situation analysis was reached, i.e., a valuable indicator for monitoring and evaluation after the application of measures aimed at improving the situation in this area.

Table 5. Traffic accidents in Podgorica municipal area [53].

Traffic Accidents	2016	2017	2018
TOTAL	1912	2238	2177
1. WITH MATERIAL DAMAGE	1278	1533	1458
• On the streets	947	1042	1122
2. WITH FATALITIES	4	9	2
• On the streets	2	2	2
3. WITH FATALITIES AND INJURIES	12	10	8
• On the streets	7	6	3
4. WITH INJURIES	618	686	709
• On the streets	402	510	527

Table 6 shows a 38.2% increase in the number of injured drivers (except bicycle, moped, tricycle and quad bike) in just two years, and an increase of 73.3% in the number of injured cyclists on the streets of Podgorica. These data are valuable for identification of the most relevant problems in the area of traffic safety, and the adoption of measures directed to resolving the identified problems in the SUMP action plan.

Table 6. Number of injuries and deaths in traffic accidents in Podgorica municipal area [53].

Injured in Traffic Accidents	2016	2017	2018
TOTAL	850	1007	978
SLIGHTLY INJURED	730	875	842
1. DRIVERS (EXCEPT BICYCLE, MOPED, TRICYCLE, QUAD BIKE)	319	438	441
• On the streets	219	303	310
2. PASSENGERS	218	272	234
• On the streets	148	172	146
3. CYCLISTS	19	27	27
• On the streets	15	21	26
4. MOPED, MOTORCYCLE, TRICYCLE, QUAD BIKE	47	35	27
• On the streets	35	21	19
5. PEDESTRIANS	127	103	113
• On the streets	119	96	102

Table 7 shows an increase of some 13.3% in the total number of severely injured persons for the observed period of two years, an increase of 83.3% in the number of severely injured cyclists on the streets, and an increase of 57.1% in the number of severely injured pedestrians on the streets. The analysis of the data obtained reveals an increasing trend in almost all observed indicators from year to year, which indicates that traffic safety in the capital requires particular attention, although it is a relatively short period of two years for which data were available. During the workshop for defining the vision of the SUMP, the issue of traffic safety was set among the priorities and strategic goals. Through the desk research previously described, a database was set up for the regular updating of these data in the coming years by the authorities in local government, in order to monitor and evaluate the effects of the adopted and implemented SUMP measures. It is important to note that a mechanism has been built for innovating data and monitoring trends that do not require any financial investments, but only for the sending of the data to the local government by the Police Directorate-Security Center Podgorica.

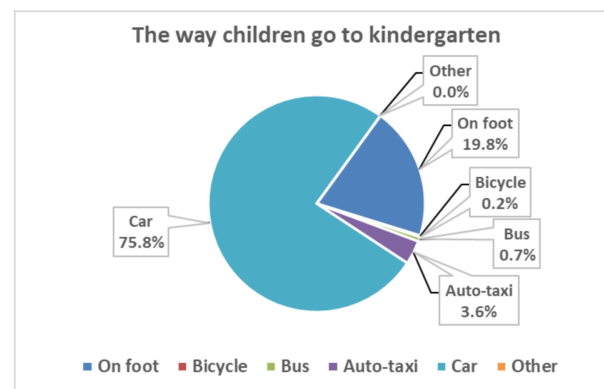
Table 7. Number of severely injured in traffic accidents in in Podgorica municipal area [53].

Severely Injured	2016	2017	2018
TOTAL	120	132	136
1. DRIVERS (EXCEPT BICYCLE, MOPED, TRICYCLE, QUAD BIKE)	41	32	32
• On the streets	15	14	11
2. PASSENGERS	31	33	37
• On the streets	14	15	10
3. BICYCLE DRIVERS	10	4	12
• On the streets	6	4	11
4. MOPED, MOTORCYCLE, TRICYCLE, QUAD BIKE	15	22	18
• On the streets	11	19	12
5. PEDESTRIANS	23	41	37
• On the streets	21	37	33

3.7. How Do Preschool Children Go to Kindergarten?

For the purposes of drafting the Podgorica SUMP, a survey was conducted in the Preschool Public Institution “Ljubica Popović” in four educational units at different locations. The selection of educational units was made with the aim of obtaining the most diverse sample, by selecting units from different territories or parts of the city, with different socio-economic categories of the population, as well as with different pedestrian infrastructure and availability of public transport near the units.

The research was conducted in July 2019. In the research, 179 parents of preschool children participated. The results of the survey graphically given in the Figure 3 showed that more than 3/4 of children come to kindergarten with their parents by car (75.8%), 19.8% on foot, about 3.6% by auto-taxi and only 0.7% use the bus as a means of transportation.

**Figure 3.** Share of modes of travel preschool children in kindergarten [53].

Parents had the opportunity to answer the question “Do you combine the trip to kindergarten with other obligations (work, shopping . . .)?”. About 93% of parents gave a positive answer to the question. In this way, data on the habits and reasons for children’s mode of transport to kindergarten were obtained. Through the use of the same questionnaire, it is planned to repeat the survey in the same educational units every year, hopefully with the participation of greater number of parents. In this way, a mechanism for monitoring and evaluating the effects of adopted and implemented SUMP measures has been established.

3.8. How Do Primary School Pupils Go to School?

The survey conducted in seven primary schools, selected according to the same criteria as preschool institutions, among other things, aimed at finding out how many children aged 6–10 and 6–14 have active schooling, i.e., how many children go to school on foot. The

survey included 2389 primary school students, who, by raising their hands, gave answers to questions. The results of the survey are graphically shown in Figure 4.

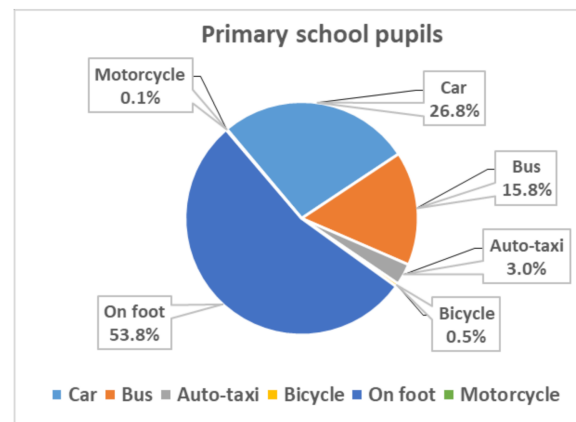


Figure 4. Share of modes of travel among primary school pupils: actual [53].

The results of the survey among primary school pupils show that more than half of pupils come to school on foot (53.8%), about 26.8% of pupils are brought to school by parents car, about 15.8% of pupils travel by bus to school, and about 3.0% come to school by taxi. When it comes to coming to school by bicycle, quite concerning information has been obtained. Only 11 children out of the total of 2389 surveyed stated that they use a bicycle as a means of transport.

The subject survey gave students the opportunity to decide which means of transportation they would like to use to travel to primary school. The results of the answers to this question are shown in Figure 5.

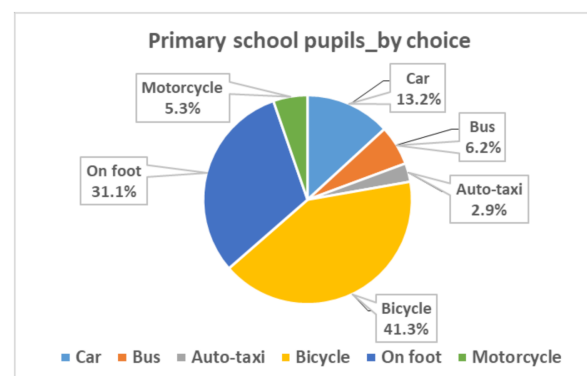


Figure 5. Share of modes of travel to the primary school: pupils' preferred option [53].

It is encouraging that 41.3% of pupils expressed a wish to come to school by bicycle, if they had the possibility to choose. This finding of the status analysis is considered very important because it is very encouraging and represents a very important resource for the popularization of this mode of transport in the future. In the process of monitoring and evaluating the effects of the application of SUMP measures, it is planned to offer pupils the same questionnaire in the same schools, and to analyze and take into account the obtained results during the possible revision of the existing SUMP and the development of a new SUMP for Podgorica.

3.9. How Do Secondary School Students Go to School?

In order to obtain data on the habits of secondary school students in Podgorica when it comes to travel to school, a survey of first and third-grade students, from four high schools, was conducted in early June 2019. The selection of secondary schools was done

according to similar criteria as for the preschools and primary schools, with a somewhat smaller possibility of selection. A total of 1577 students participated in the survey, of which 548 attended the first and 1029 the third grade of secondary school.

The results of the survey among high school students, which are given in Figure 6, show that about a third of students travel to school by bus (32.8%), 25.7% of students come to school on foot, 20.0% of students are come to school by car or drive to school, 20.5% come to school by auto-taxi and only 0.9% come by bike. The relatively high share of bus arrivals can be attributed to the fact that many high school students live in suburbs, and surrounding villages, and must thus use this mode of transport. The survey obtained a worrying percentage of 20% of students who come to school using auto-taxi vehicles.

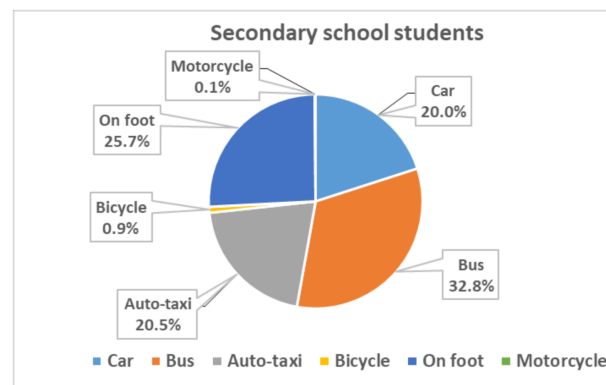


Figure 6. Share of modes of travel: secondary school students—actual [53].

The survey was conducted with the possibility for students to suggest which means of transport they would use if they have a choice, and the results are shown in Figure 7.

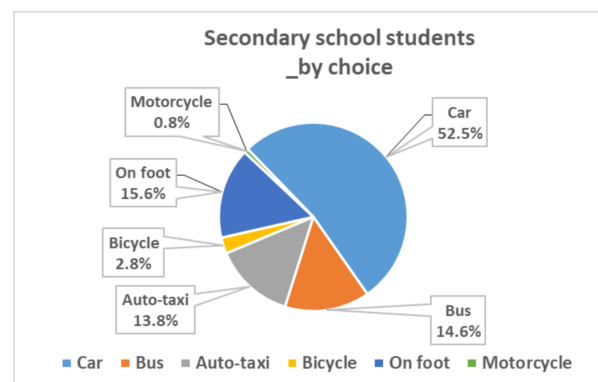


Figure 7. Share of modes of travel: secondary school students' preferred option [53].

The percentage of 52.5% of students who would like to come to school in their own car is especially emphasized here. This worrying data constitute one of the key findings of the status analysis, and deserves special attention when selecting measures within the SUMP action plan. It is planned that, with regard to the previously described surveys, identical surveys will be repeated in the same schools in the following years, in order to monitor and evaluate the effects of the applied measures from the SUMP.

3.10. Modal Split

Due to the limited budget available for monitoring and evaluation of the first SUMP for Podgorica, the expert team had to seek low-cost methods in performing the status analysis. One of them was so-called manual cordon counting, which is a simple and cost-efficient method to obtain insights into the modal split of the analyzed city. The expert team had previous experience with this method from developing SUMPs in Slovenia

and providing a detailed methodology for the manual cordon counting for the Slovenian Ministry of infrastructure. Podgorica is a city that has developed quite equally on either bank of the Morača River, in such a way that both sides offer residents a variety of facilities that generate a significant number of trips on a daily basis, so the bridges on the Morača River were selected as ideal locations for counting traffic in two peak intervals.

The traffic was manually counted on 12 June 2019. The count was performed in the morning peak interval (6:30–9:30) and afternoon peak interval (14:30–17:30). The traffic counting was performed on the five bridges over the Morača River (Vezirov Bridge, Millennium Bridge, Blazo Jovanovic Bridge, Union Bridge, and Krivi Bridge) intended for motor vehicle traffic (Figure 8).

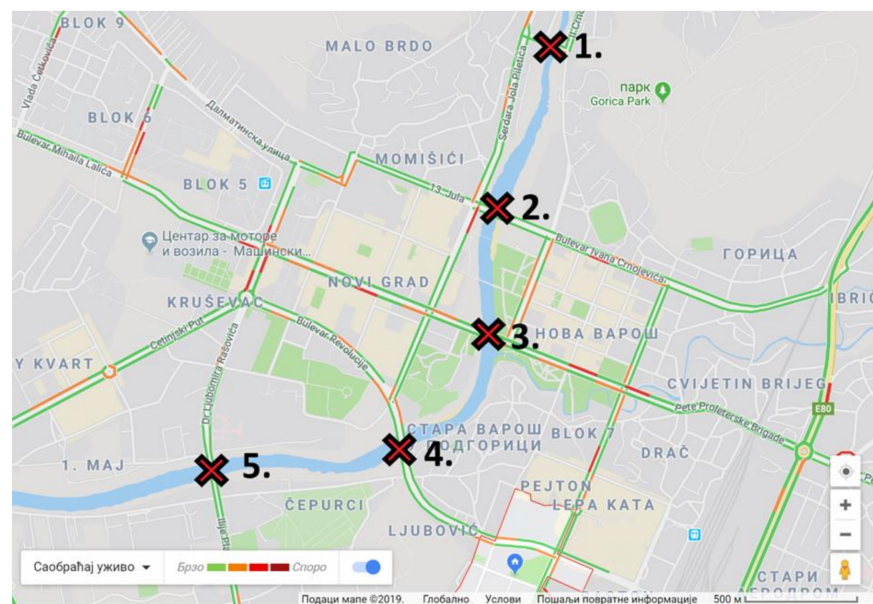


Figure 8. Locations of motor vehicle traffic counting [53].

Obviously, the most methodologically rigorous method for gathering data on modal split would be a household survey of citizens and those who travel to Podgorica from surrounding areas, but resources (particularly resources for the future monitoring of the SUMP, once financial support for the initial project from GIZ has ended) were limited. Taking inspiration from UK practice in the early 2000s when SUMP's had to be prepared at short notice, the manual cordon counting was used here in Podgorica as a means to obtain a reasonable estimate of the modal split in the key areas of the city, and in a manner that is easily replicated in future years to track the changes in the modal split [56]. The traffic count results have been processed and are a valuable source of data from which numerous analyses can be made and significant conclusions can be drawn. The results are presented in the Table 8.

Table 8. Results of motor vehicle counting performed on 12 June 2019 at 5 sites for 6 h [53].

Locations	Passenger Cars	Auto-Taxi Vehicles	Vans	Motorcycles	Buses	Light Trucks	Heavy Trucks	Tractors	Total
1. Vezirov Bridge	5858	797	45	48	40	285	40	1	7114
2. Millennium Bridge	9184	1104	125	71	136	169	26	1	10,816
3. Blazo Jovanovic Bridge	11,168	1532	112	132	215	251	4	4	13,418
4. Union Bridge	10,455	1355	148	85	36	244	21	2	12,346
5. Krivi Bridge	8541	1053	215	72	153	387	26	0	10,447
Total:	45,205	5842	645	408	580	1336	117	8	54,141

The analysis of the traffic count results shows that the highest traffic intensity is over the Blazo Jovanovic Bridge. A slightly higher number of vehicles was recorded on the Millennium Bridge than on the Union Bridge. Figure 9, which shows the distribution of vehicles by categories, shows that the passenger cars were the dominant category with about 83.5%, followed by auto-taxi vehicles with 10.8%, while all other categories were represented in negligible smaller percentages.

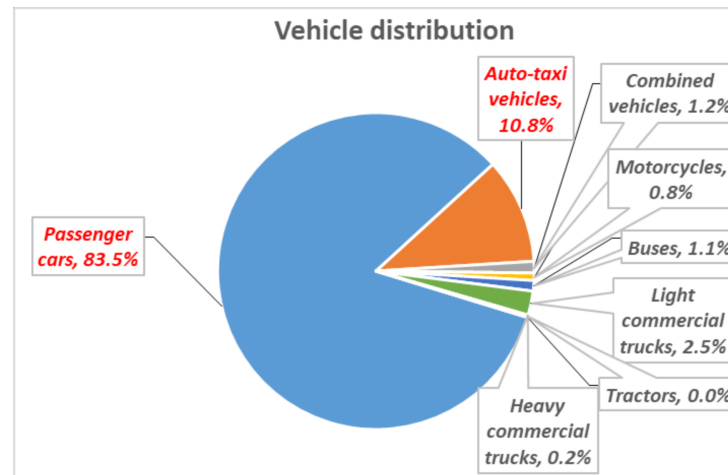


Figure 9. Distribution of vehicles by category [53].

The manual count of the passengers was also performed on two pedestrian bridges (Moskovski and Gazela), which are located between the Millennium and Blazo Jovanovic Bridge, at the same time intervals (Figure 10).



Figure 10. Locations of pedestrian bridges where counting was performed [53].

The data obtained on pedestrian bridges were associated with the data obtained on bridges for motor vehicle traffic and integrated into the overall data on citizens' habits with respect to mobility (Table 9).

Based on the previously presented results, a modal split was made, which is shown in Figure 11.

Table 9. Results of the number of passengers obtained by counting the traffic on the bridges [53].

Locations	Passenger Cars	Auto-Taxi Vehicles	Vans	Walkers	Cyclists	Motorcycles	Buses	Light Trucks	Heavy Trucks	Tractors	Total
1. Vezirov Bridge	8527	1433	78	379	70	48	385	428	40	1	11,389
2. Millennium Bridge	13,393	1912	249	630	39	71	1380	170	26	1	17,871
3. Blazo Jovanovic Bridge	15,359	2955	240	1482	199	132	1785	386	4	4	22,546
4. Union Bridge	14,366	2523	318	888	154	85	255	332	21	2	18,944
5. Krivi Bridge	11,553	1785	428	684	99	72	1170	387	26	0	16,204
6. Moskovski Bridge	-	-	-	894	43	-	-	-	-	-	937
7. Gazela Bridge	-	-	-	1531	6	-	-	-	-	-	1537
Total:	63,198	10,608	1313	6488	610	408	4975	1703	117	8	89,375

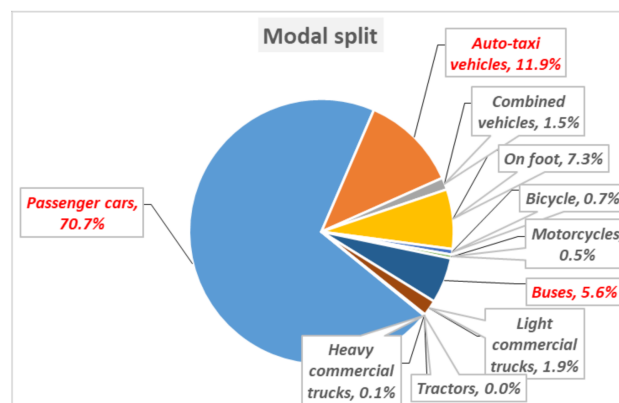
**Figure 11.** Percentage of passengers using each transport mode [53].

Figure 11 shows that the citizens of Podgorica predominantly use individual transport by passenger car (70.7%) and auto-taxi vehicle (11.9%). Only 5.6% of citizens use public transport, 7.3% use walking, and only 0.7% use bicycles. The obtained results represent very valuable data that were quantified for the first time in Podgorica, because there are no traffic meters at any location in the city, nor has there previously been any form of regular travel survey. The obtained data are worrying because only 13.6% of citizens use public and non-motorized transport. The applied methodology, although simple, is a very good tool for the monitoring and evaluation process because it is envisaged that students of Road Traffic repeat this research every year, at the same time, at the same locations. Thanks to the manual counting of traffic, the data on the degree of vehicle occupancy, which amounted to 1.45, were obtained, which will also be monitored in the coming years.

3.11. Population Satisfaction

The use of online surveys is increasingly in use, pushing into the background traditional survey research methods. The advantages of an online survey include access to individuals in distant locations, the ability to reach difficult to contact participants, and the convenience of having automated data collection, which significantly reduces researcher effort and time. Disadvantages of online survey research include uncertainty over the validity of the data and sampling issues, and concerns surrounding the design, implementation, and evaluation of an online survey [57]. Taking into account these different advantages and disadvantages, it was decided to make an online survey available to citizens on the official website of Podgorica city in July 2019 to obtain information on population satisfaction with the traffic system (309 citizens participated). In order to evaluate the relevance of the

survey results in terms of the spatial distribution of respondents, i.e., the representation of almost all parts of Podgorica, the respondents were asked to fill out information regarding the part of the city in which they live. Analysis of the answers to this question led to the conclusion that they were coming from almost all parts of the Podgorica, so the survey results can be considered relevant. Participants in the online survey commented on their monthly income and represented all categories of the population fairly equally. Women were a few percent more represented in the observed sample.

The data obtained are shown below in the following figures.

The analysis of the survey results presented in Figure 12 shows that only 0.7% of the Podgorica population rated the current state of the traffic system as exceptionally good, and 13.2% as satisfactory. On the other hand, about 42.6% of the population thinks that the current state of the traffic system is unsatisfactory, and as many (43.2%) citizens think that the state is extremely bad, which best indicates the urgent need to develop and implement the SUMP.

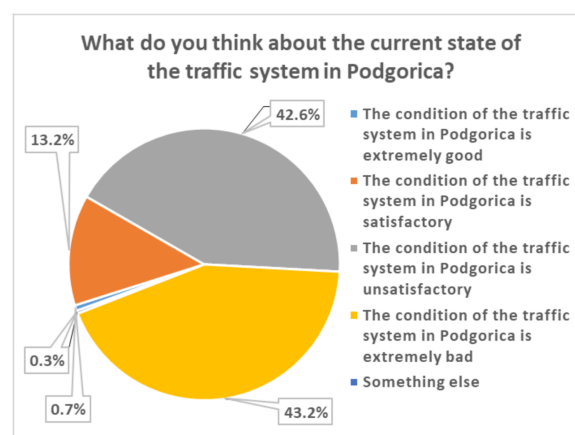


Figure 12. Distribution of citizens' answers regarding satisfaction with the current state of the traffic system in Podgorica [53].

The analysis of the survey results presented in Figure 13 shows that citizens believe that the main cause of the poor traffic situation is non-compliance with traffic regulations, which was stated by 24.4% of citizens surveyed, then inadequate public transport (20.7%), followed by excessive use of passenger cars (19.4%), lack of parking space (15.9%), etc. These data are considered one of the key findings of the status analysis because the citizens pointed out the problem that they consider to be the main cause of the unsatisfactory state of the traffic system. We want to emphasize that on the other hand, the local government invests tens of millions of euros in the traffic infrastructure continuously from year to year, and the situation in the traffic system is deteriorating. So, in this way, decision-makers receive feedback from citizens that the solution to the problem is something completely different, especially since the solution to the problem does not require large investments, but only consistent compliance with regulations.

Concerning satisfaction with the existing public urban transport arrangements, about 73.3% of the surveyed citizens say they are extremely dissatisfied and feel that the Podgorica should put this issue at the top of its priority list, about 24.7% are partially satisfied and only about 2.0% are extremely satisfied with the existing situation (Figure 14). This is also a key finding of the status analysis because the results are so convincing that they unequivocally indicate that public transport in Podgorica is not organized appropriately and that it requires urgent interventions and numerous measures to improve citizens' opinions in the coming years. The answers received from the citizens on this topic confirm the reasons for the small participation of public transport in the modal split.

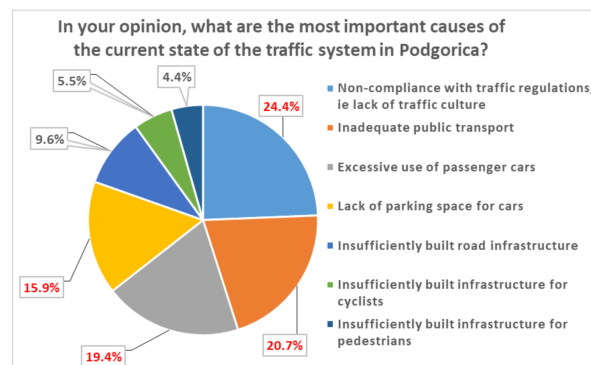


Figure 13. Distribution of citizens' answers regarding the causes of the current state of the traffic system in Podgorica [53].

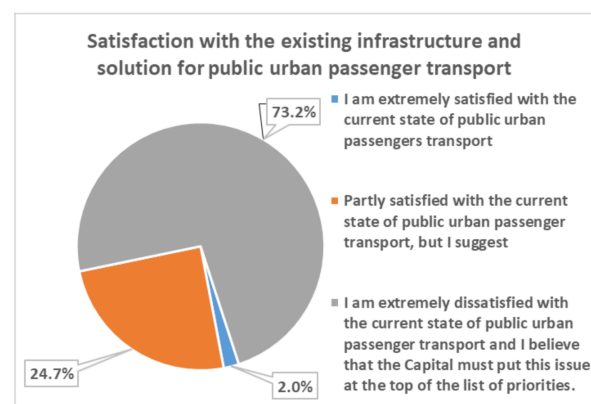


Figure 14. Distribution of citizens' answers regarding satisfaction with existing public urban transport arrangements [53].

Figure 15 shows the level of citizens' satisfaction with the existing infrastructure and car parking solutions, where it can be seen that only 3.9% of the surveyed citizens said that they were extremely satisfied with the current state of parking infrastructure and car parking solutions, 59.9% are extremely dissatisfied, and about 36.2% are partially satisfied. This finding of the status analysis can also be considered crucial as it indicates the great dissatisfaction of the citizens with the existing state of the parking infrastructure and the car parking solution. This also sends a strong message to citizens to local government decision-makers to pay special attention to this problem.

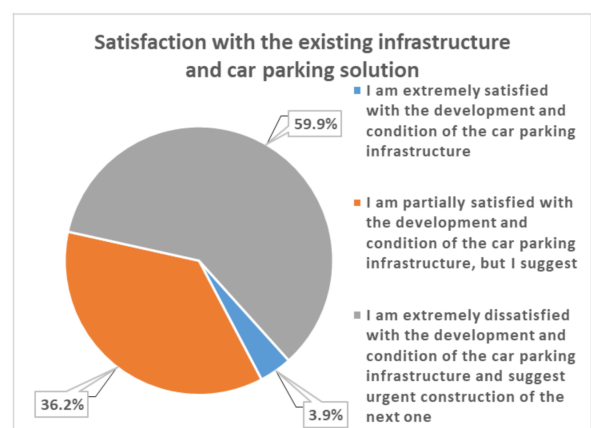


Figure 15. Distribution of citizens' answers regarding satisfaction with existing infrastructure and car parking solutions [53].

Figure 16 shows the results of the citizen satisfaction survey regarding existing cycling infrastructure, which shows that about 14.8% are extremely satisfied with the cycling infrastructure, 21.4% are extremely dissatisfied, and about 63.8% are partially satisfied. These results realistically show much less dissatisfaction of citizens than the previous two topics (public transport and parking), because in recent years a significant number of bicycle paths have been built, i.e., the cycling infrastructure has been significantly improved, which can be felt through citizens' responses to this topic.

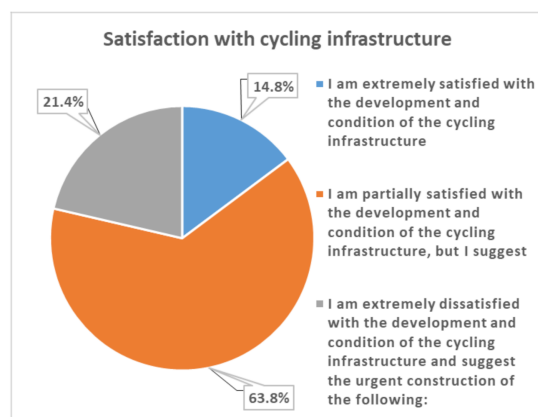


Figure 16. Distribution of citizens' answers regarding satisfaction with cycling infrastructure in Podgorica [53].

Figure 17 shows the results of the citizen satisfaction survey regarding existing pedestrian infrastructure, which shows that about 13.1% are extremely satisfied with the pedestrian infrastructure, 67.0% are extremely dissatisfied, and about 19.9% are partially satisfied. Citizens' responses to this question are similar to those on satisfaction with cycling infrastructure. In addition, the somewhat more favorable responses of citizens are the result of significant investments on the part of local government in previous years when it comes to pedestrian infrastructure.

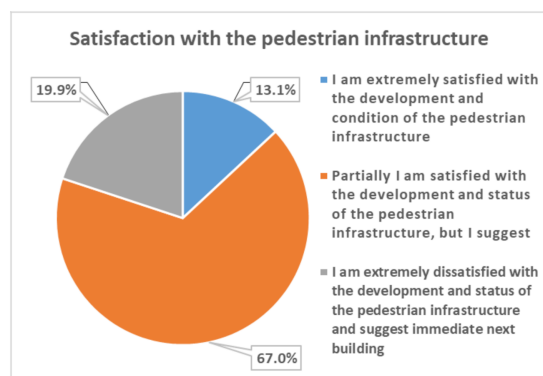


Figure 17. Distribution of citizens' answers regarding satisfaction with pedestrian infrastructure in Podgorica [53].

Finally, it can be concluded that the results of the online research are very logical and fully reflect the real state of affairs in Podgorica, so they can be taken as relevant for the adoption of appropriate measures to improve the current situation. By repeating the online research on the website of the municipality of Podgorica with the same questions, it is possible from year to year to monitor the satisfaction of citizens with the state of the traffic system as a whole and in individual segments.

Through the comments given by the citizens, along with the answers to the questions asked, a certain number of citizens expressed distrust in the existence of a political will for

the implementation of SUMP, because many strategic documents in the past have lacked consistent implementation, which is also a key finding of the status analysis.

3.12. Analysis of Current Parking Policy and Measures Using a Method Called ParkPAD

ParkPAD is a tool for auditing a city's parking policy and for reaching consensus among stakeholders on how the parking policy and related measures should be developed [58].

Through the application of the ParkPAD tool to Podgorica, it was determined that the urban mobility system is currently planned in a way that gives preference to the passenger car. However, to achieve sustainability, a better quality of life (reduction in traffic congestion), but also better economic opportunities, this situation must change. ParkPAD is introducing measures to manage the use of cars, especially parking, but also access control and the possible establishment of low-emission zones. By applying the ParkPAD methodology, it was concluded that there is a relatively low level of public participation in the development of parking policy, except in the procedures of drafting new spatial planning documents. To help develop the acceptance of new parking measures, it is important to ensure wider public participation in policymaking and definition, but it is also important that public participation includes a wide range of citizens. Applying the ParkPAD methodology, developed as part of a specific project funded through EU funds and carried out in Podgorica, it was recommended that the new SUMP for Podgorica include in its action plan a parking management strategy with an analysis of the current situation including major challenges for the future development of parking policy in the city and the actions necessary to reach the goals.

As a result of the conducted ParkPAD analysis, it is recommended that the new parking strategy will be based on two main principles:

1. There is no need to provide a parking space for everyone who wants one at the time and place that they want it: the problem of not being able to find a parking space is not a problem that absolutely needs to be solved by the city at every time and in every location.
2. Parking should not be the dominant use of public space: it is necessary and reasonable to manage parking to free public space for other users.

Accordingly, the ParkPAD vision formulated for public space and parking is a:

“Systematic management of street space in the city to provide well-maintained and efficiently used parking spaces whilst freeing up more street space for other users, in particular, so as to provide safe high-quality infrastructure for pedestrians and cyclists, and more public space to support the social life of the city”.

3.13. Analysis of Current Cycling Policy and Measures Using a Method Called BYPAD

BYPAD (Bicycle Policy Audit) analysis is an audit of cycling development policy in the city, region, or state [59,60]. Developed by an international consortium of cycling experts as part of an EU-funded project, BYPAD analysis builds on best international practices in the field of cycling development as a way of urban mobility and provides a good overview of the measures implemented and possible improvements in local cycling policy.

The BYPAD process began in September 2019 when a BYPAD questionnaire was sent to eight stakeholder representatives, three city councilors, two local government officials, and three users, as a preparation for a workshop.

During the workshop, where stakeholders presented their views and opinions, various issues were discussed and a consensus on key challenges that need addressing in the future were selected. Subsequently, a selection of possible measures was made and priorities for implementation were voted on. Part of the evaluation process was cycling to visit completed bicycle projects in Podgorica. The route selected covered major cycling hinterlands and key destinations relevant to cyclists. The results of the BYPAD analysis are graphically shown in Figure 18.

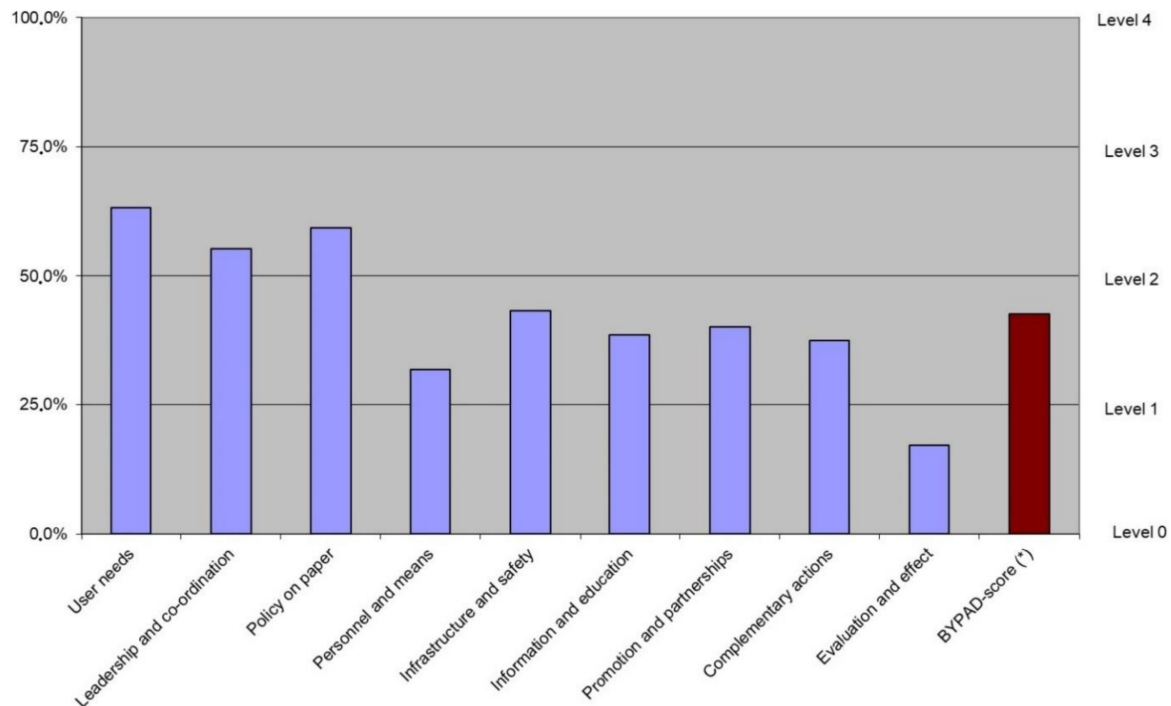


Figure 18. Graph showing the results of BYPAD analysis [53].

The cycling policy of the Podgorica has been assessed according to the following BYPAD development scale:

- Level 0: (Almost) no activity (<25%);
- Level 1: Ad hoc-oriented approach (≥ 25 to <50%);
- Level 2: Isolated approach (≥ 50 to <75%);
- Level 3: System-oriented approach (≥ 75 to <100%);
- Level 4: Integrated approach (100%).

On the weighted BYPAD development scale, Podgorica achieves level 1.7, or a BYPAD score 42.7%. This means that, according to this methodology, it is estimated that most of the Podgorica cycling policies are still at the “ad hoc-oriented approach” level, but are approaching the “isolated approach” level.

The main findings of the BYPAD analysis are:

1. Generally, the field of cycling is developing in Podgorica;
2. There is a dialogue between political leadership, administration, and users;
3. The drafting of strategic documents for the development of cycling has been started;
4. Resources and staff are limited;
5. The first bike routes have been built. Some solutions are good, while others require improvements;
6. Bicycle parking facilities are being developed;
7. The attitude towards cycling is generally positive, while in practice there are conflicts between cars and cyclists, as well as pedestrians and cyclists;
8. Informing and educating citizens and potential groups of bicycle users has great potential for development;
9. Increased funds and human resources for the field of cycling are required;
10. Further development of infrastructure should focus on traffic safety, especially for cyclists and pedestrians.

The results of the BYPAD analysis represent a valuable basis for the adoption of SUMP measures to stimulate and popularize this mode of transport.

4. Discussion

The transport infrastructure built in Podgorica during the last several years was not able to develop at a rate that would be in line with the increase in the number of registered vehicles. It is not rational to expect either the transport infrastructure or the ecosystem to be able to face the development that would be needed to allow all citizens, who are so inclined, to drive and park their private cars without inconvenience, problems, and constraints. A rational solution is a long term, consistent and systematic effort to manage the use of these cars, and their numbers. SUMP is the possible solution for problems in the functioning of the traffic system.

The status analysis is the basis on which the current state of the traffic system is described and against which progress will be monitored in the further stages of the preparation and implementation of SUMP measures. During the process of making a status analysis, various techniques were used to obtain valuable insights into citizens' habits when it comes to mobility, using data collection approaches that are inexpensive and easily replicable. Bearing in mind that only limited data were available beforehand and that local governments do not have large budgets, the financial aspect of data collection was very important when choosing the methodology, because of the need to have a relatively broad set of indicators, but at the same time for them to be affordable.

As described in the paper, several surveys have been conducted very successfully. The interest of the citizens was satisfactory when they became aware that their answers help to provide a realistic picture of the current state of urban mobility in the city, and that their suggestions for improvements will be heard and accepted by someone.

All other surveys, including manual traffic counting by students of road traffic, gave valuable results and are easily reproducible in the coming years. The manual method of traffic counting by students, in addition to being cost efficient, gives the possibility to record the number of passengers in the vehicle as opposed to measuring the flow via automatic traffic counters, which are more often used to measure the flow of traffic. The authors of this paper applied this methodology thanks to the positive experiences in the development of the Sustainable Mobility Plan for the Municipality of Ljutomer in Slovenia, which was done in 2012 [61]. Repeatability was confirmed by periodic repetition of traffic counts in 2014 [62], 2017 [63] and 2018 [64]. The data collected forms a baseline overview and a very convenient mechanism for monitoring and evaluating the effects of the implementation of measures from the SUMP action plan in future. The most important thing was to have identified key challenges that the SUMP must address.

The key findings of the status analysis that collected information on the current state of mobility in Podgorica are presented below:

- Podgorica has been no experience with comprehensive and integrated urban mobility planning so far;
- The population of Podgorica has increased by 24.1% in the last 18 years;
- In the 2013–2018 period, some EUR 57,583,543 was invested in transport infrastructure;
- The total number of registered vehicles increased in the 2014–2018 period by 25.5%, while the total number of the first-time registered vehicles in Podgorica increased by 78.9% in the same period;
- The increase in the motorization rate in the 2014–2018 period was 18.6%;
- There are no data on the total number of marked parking spaces on the streets, parking lots, underground garages of residential buildings, and other areas intended for parking, in the territory of Podgorica;
- The number of traffic accidents with injured persons on the streets in 2018 increased by 31.0% compared to 2016, and an increase in almost all road danger indicators was observed from year to year;
- About 75.8% of children in kindergarten travel there with their parents by car because parents usually combine this journey with travel to work;
- The survey of primary school pupils shows that more than half of pupils come to school on foot (53.8%), about 26.8% of pupils are brought to school in their parents'

car, and 41.3% of pupils expressed a wish to come to school by bicycle if they had a choice;

- The survey among high school students shows that 20.5% of students travel to school by taxi, and 52.5% of students would like to come to school in their own car if they had a choice;
- In terms of vehicle distribution, the passenger cars category was dominant with about 83.5%, followed by taxi cars with 10.8%, while all other categories were represented in negligible smaller percentages;
- The modal split shows that the citizens of Podgorica predominantly use individual transport by passenger cars (70.7%) and auto-taxi vehicles (11.9%), while the public transport and non-motorized transport are used by just 13.6% of the citizens of Podgorica;
- The degree of passenger cars occupancy is 1.45;
- About 85.8% of the citizens of the Podgorica believe that the condition of the traffic system is not satisfactory, i.e., that it is extremely bad;
- Overall, 24.4% of the citizens believe that the main cause of the poor traffic situation is non-compliance with traffic regulations;
- About 73.2% of the surveyed citizens say they are extremely dissatisfied and 24.7% claim to be partially satisfied with the existing public urban transport solutions;
- About 59.9% of the surveyed citizens say they are extremely dissatisfied and 36.2% claim to be partially satisfied with existing state of parking infrastructure and car parking solutions;
- About 21.4% of the surveyed citizens say they are extremely dissatisfied and 63.8% claim to be partially satisfied with existing cycling infrastructure;
- About 19.9% of the surveyed citizens say they are extremely dissatisfied and 67.0% claim to be partially satisfied with existing pedestrian infrastructure;
- Podgorica does not have a parking management strategy;
- The topic of cycling is being developed in Podgorica through the construction of bicycle paths and parking lots, with conflicts between cars and cyclists, as well as between pedestrians and cyclists;
- Citizens surveyed fully support the drafting of the SUMP but fear that there will be no support from politicians for its consistent implementation.

Overall, the data collected show a situation of high motorised transport demand in a small but growing city, generating significant negative effects and with a high level of dissatisfaction amongst citizens.

The following key challenges were identified during the development of the SUMP:

- Creating conditions for comprehensive and integrated urban mobility planning;
- Finding solutions so that continuous increases in population, number of registered vehicles and motorization rate do not jeopardize the sustainable development of Podgorica;
- Ensuring compliance with traffic rules by all traffic participants without exception;
- Redirecting citizens from the use of passenger cars and auto-taxi vehicles to the use of public and non-motorized transport;
- Providing political support and sufficient financial resources for the implementation of the SUMP.

The experience of EU cities that have completed the process of developing and implementing SUMPs indicates that this results in economic benefits [65,66], benefits from reducing dependence on cars [67], benefits from traffic calming measures [68,69], and benefits for cyclists' safety [70] and traffic safety as a whole [71], thus achieving the final goal of improving quality of life for all citizens [16,72]. Based on these experiences, it is realistic to expect that the implementation of the SUMP will provide a better quality of life for the citizens of Podgorica. Otherwise, there is a real danger that traffic will become a factor limiting the further development of Podgorica and a significant cause of discontent

among the citizens, so that a consensus of all stakeholders on the need for a SUMP is expected.

5. Conclusions

The approach to transport planning described in the paper focuses on citizens of Podgorica, unlike the previous paradigm that was subordinated to cars and the intention to create as much infrastructure for cars as possible, often to the detriment of the quality of infrastructure and the safety of non-motorized road users.

A very important fact is that all the data presented in this paper were obtained using only a cost-effective and easily repeatable methodology, which will allow the local government to collect and update the data on an annual basis, in order to monitor and evaluate the achievements of the SUMP.

All research results that are presented in detail in the paper are logical and quantify certain indicators that will be monitored in the coming years. It is very important that with the help of experts who led the process, a sustainable infrastructure was built for a very simple repetition of all research, by local government employees, at almost no external cost. Therefore, by continuing to collect data, the existing data, collected through the desk research, are upgraded, and the trends and specific goals set by the SUMP are monitored. By conducting research in kindergartens, primary and secondary schools using the same questionnaires, new data will be obtained every year, which can be compared with the data from the previous year after simple statistical processing. The online research questionnaire that is published on the municipality's website is also ready and it is very easy to repeat this research, process the obtained results, and compare it with the previous year. Especially valuable is the establishment of a mechanism for manual traffic counting, in which students of the Faculty of Mechanical Engineering who participate in the Road Traffic program, as part of their practical classes, perform traffic counts under the supervision of the teacher of the Basics of Traffic Planning course. The benefit is mutual because students gain valuable practical knowledge and the local government obtains reliable and valuable data for free. In this way, the effects of the application of the measures prescribed by the SUMP will be visible. Thanks to the previously described mechanism for collecting data, and for the monitoring and evaluation of the SUMP, in addition to the costs of payment to specialized companies that would conduct research according to the needs of local government, a complicated public procurement process is avoided, which—if unsuccessful—would mean that no data are obtained in a given year. There is also the possibility for different companies to acquire the contract each year, so there would be deviations in the way the research is conducted depending on their experience and level of professional responsibility.

The contribution of citizens was particularly valuable in providing numerous suggestions, remarks, and comments that best justify the participatory approach that is insisted upon in the preparation of the SUMP. Thus, by applying the methodology described in the paper, it was possible to reach the citizens and hear their opinion on numerous issues in the field of the traffic system. Numerous problems have been identified and quantified through appropriate indicators, i.e., the diagnosis of the existing condition or "disease" of the traffic system has been made. The SUMP action plan prescribes measures that are not the subject of this paper as "medicines" for improving the "health" condition of the traffic system.

The methodology, described in detail in the paper, is implemented in such a way that employees in local government can regularly update the data without major restrictions and monitor the effects of the application of SUMP from year to year. The described methodology can be applied in all cities of the Western Balkans, because all local governments, to a greater or lesser extent, have problems with finances. The typical practice with the SUMPs conducted so far in this region was that the activity was financed through an EU project or donation, and contracts were often established in consultation with western European countries. Problems then arise not only with the implementation of SUMP measures, but also with the monitoring and evaluation of the effects of SUMP, once the

external financial support has finished. The methodology described in this paper, due to its simplicity in every respect, reduces the risk of failure of this process.

Further research could focus on the realization of studies that, previously, were not successfully performed. This could include, for example, a survey of employees in a medium or large enterprise to obtain data on the habits of employees when it comes to transportation to the workplace.

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