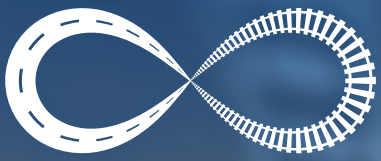

CETRA 2018

5th International Conference on Road and Rail Infrastructure
17–19 May 2018, Zadar, Croatia

Road and Rail Infrastructure V

Stjepan Lakušić – EDITOR

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CETRA 2018
5th International Conference on Road and Rail Infrastructure
17–19 May 2018, Zadar, Croatia

TITLE
Road and Rail Infrastructure V, Proceedings of the Conference CETRA 2018

EDITED BY
Stjepan Lakušić

ISSN
1848-9850

ISBN
978-953-8168-25-3

DOI
10.5592/CO/CETRA.2018

PUBLISHED BY
Department of Transportation
Faculty of Civil Engineering
University of Zagreb
Kačićeva 26, 10000 Zagreb, Croatia

DESIGN, LAYOUT & COVER PAGE
minimum d.o.o.
Marko Uremović · Matej Korlaet

PRINTED IN ZAGREB, CROATIA BY
"Tiskara Zelina", May 2018

COPIES
500

Zagreb, May 2018.

Proceedings of the
5th International Conference on Road and Rail Infrastructures – CETRA 2018
17–19 May 2018, Zadar, Croatia

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CETRA 2018 17–19 May 2018, Zadar, Croatia
5th International Conference on Road and Rail Infrastructure

DATA NEEDS FOR LONG-TERM URBAN MOBILITY PLANNING: DIFFICULTIES OBSERVED IN PRACTICES

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Abstract

In this paper, we present the results of our research accompanying data collection activities carried out in 12 different territorial authorities in Eastern and South-Eastern Europe that served as a basis to prepare sustainable urban mobility plans. With the basis of the data needs for long-term urban transport and mobility planning, we analysed data availability, substitution by regional or national representative statistics, and response from the participating authorities. The modal split data and motorization rate (vehicle per 1000 inhabitants) tend to be readily available in many places while the data about travel time and distance tend to be in lack. In case data is available, it is much from an ad-hoc survey on one-time basis, and systematic and continuous surveys is in lack. This is a risk for the long-term strategic mobility plans as a proper monitoring is not enabled.

Keywords: travel survey, mobility data, strategic mobility plan, SUMP

1 Introduction

To analyse the status quo, to set the future target, and to monitor the changes in transport and mobility, it is essential to have a set of reliable mobility data. However, the availability of the mobility data is not a given thing, and not comparable to that of the demographic or land ownership data. Data collection of mobility data in Eastern and South-Eastern Europe remain on a starting phase.

After the accession of the 10 new Member States to the EU in 2004 followed by three others in 2007 and 2013, the strategic urban mobility plans is being dispersed with a support from the EU. In this context, the needs for mobility data is increasing in this region. We had an opportunity to carry out an accompanying research to the start-up phase of preparing Sustainable Urban Mobility Plans (SUMPs) by 12 functional urban areas (FUAs) in South-East and Eastern European countries. In this phase, the main tasks was to identify and collect mobility-related data with existing source.

In this paper, after a short literature review on strategic urban mobility plan incl. SUMPs and mobility-related data collection (Section 2), the data collection activities that we accompanied are summarized (Section 3). With a short section about our analysis framework (Section 4), we summarize the analysis results (Section 5). Section 6 concludes this paper.

DOI: https://doi.org/10.5592/CO/CETRA.2018.689

2 Existing research and practice

2.1 Strategic Urban Mobility Plan

Practice of long-term transport planning started together with a mass motorisation in the post-war period. For a long period, transport master plans were often mono-modal typically focusing on the automobile traffic, and the focus was set to plan the (road) infrastructure, commonly both in the urban and the national-level master plans. Paradigm gradually shifted from mono-modal plan to multi-modal plan as well as from infrastructure-focused to human oriented. Such human-oriented strategic urban mobility planning was in practice over decades in Western European countries, as seen e.g. in France's "Urban Mobility Plan", which was legally formalized in 1982 and made mandatory for the urban agglomeration with more than 100,000 inhabitants in 1996. In the UK, "Local Transport Plans" has been in practices for decades, [1, 6].
In the field of research, many attempts were made to make such planning activities more comprehensive since the 1990s to 2000s, not only in the context of the transport planning, but extended to strategic planning of land use and transport infrastructures [2]. The EU made an effort to diffuse the concept in the last decade: the most important milestone was the publication of the guideline in 2013 [3].

2.2 Collection of mobility data – household travel survey

In Western Europe and other developed countries, household travel surveys are in practice for decades, such as Mikrozensus in Switzerland, surveys based on KONTIV-design in Germany, National Travel Survey in the UK, National Household Travel Survey in the US and Person-trip Survey in Japan. [See e.g. 6]
Various attempts have been made to make use of digital devices e.g. GPS trackers, smartphones, etc. Matching of data needs and collection methods were analysed to integrate the new technologies and existing paper- or telephone-based methods [4, 5]. Some attempts to harmonize such household survey has been made, but it has not yet been a reality in a European scale [6].

3 Data collection activities and accompanying research

3.1 Context of the data collection practices

We had an opportunity to carry out ancillary research of the start-up phase to prepare SUMPs in 12 Eastern and South-Eastern European FUAs. 12 participating institutions were in charge of data collection in the practice. In this framework, the mobility data plays an important role as it is needed in three different senses. Firstly, it is necessary to understand the status quo in a quantitative manner.
Data is also needed to set future policy goals with quantitative and measurable indicators: for example, qualitative goal "to increase the modal share of cycling" becomes quantitative and measurable with an indicator "modal share" e.g. "to increase the share of cycling from 6 % to 10 % by 2025". Furthermore, to set a package of measures, it is necessary to know the distribution of "trip length" as the reachable range of the bicycle is limited to a few kilometres. Thirdly, a set of mobility-related data is needed to monitor the changes during the implementation phase of the plan in the future. In an above-mentioned example, the indicator "modal share" has to be regularly surveyed so that the evaluation of the bicycle's modal share can be made. Our accompanying research aimed (1) to gain an insight into the availability of the mobility data with existing resources and (2) to analyse the response of the practitioners when data is not available through this data collection process.

3.2 Participating institutions

8 municipalities and 4 regional-level agencies from Eastern and South-Eastern Europe participated in the data collection activities. Among the municipalities, two are districts within a large city (counted as municipality), while the others are the municipalities of the core city. The countries of the participating institutions spreads out to 8 different ones: 2 each from Croatia, Hungary, Romania and Slovenia and 1 each from Austria, Bosnia and Hercegovina, Bulgaria, and Czech Republic. Most of them are new Member States of the European Union: In this region, the concept of SUMPs, relevant data needs and thus data collection activities are rather new.
The size in terms of population varies as summarized in Table 1. As shown in Table 2, the "weight" of the core city is different among them. The FUAs of all of the participating institutions experience that the in- and out-flow from the core city to the surrounding region within the FUA is heavily dependent on automobiles, and the needs for coherent strategic mobility planning within each FUA is well perceived by the local experts.

Table 1 Number of participating institutions by population

Population classification	No. of participating institution	
	By core city's population	By FUA's population
0 – 10,000	1	0
10,000 – 50,000	4	4
50,000 – 100,000	4	3
100,000 – 300,000	2	2
More than 300,000	0	3

Table 2 Number of participating institutions by the proportion of the population in the core city

Population % of core city	No. of participating institution
0 – 20 %	2
20 – 40 %	2
40 – 60 %	4
60 – 80 %	3
80 – 100 %	0

Note: One participating institution was not able to distinguish the core city and the entire FUA population due to the availability of the statistics, as the municipality covers a very wide area encompassing the urban centre and suburbs. The whole municipality is considered to be one FUA.

3.3 Data collection activities

During the data collection activities which our research accompanied, employees of the participating institutions or local experts assigned them collected a variety of the data using an existing statistics and available recent surveys.
The whole data set was standardized with a template and subcategorized by five groups, namely demography (e.g. population), urban data (e.g. employment; schools; tourists; household size, etc.), urban facilities (e.g. available transport services; parking capacity), transport infrastructure (e.g. network length), and mobility statistics (e.g. modal split; trip duration). This subcategorization was made for ease of the data collection by the local experts with a consideration of potential data source rather than data groups. If no data is available at all, these participating experts were allowed to carry out "expert guesses".

In this set of data, basic mobility-related indicators were embedded in some of the subcategories. The key indicators we focused are as listed in Table 3 below.

Table 3 Collected key mobility-related indicators

Indicator	Subdivision	Unit
Modal Split	Railway; Bus; Boat/ferry; Car/taxi; Bicycle; Walking	In %
Trip purpose	Work; Education; Business; Shopping; Leisure; Pick-up/Drop-off; Visiting someone; Private purpose; Going home; Other	In %
Avg. travel time	By trip purpose	Minutes
Avg. trip distance	By trip purpose	km
Motorization rate	In a time-series of 1990, 2000 and 2010	Cars per 1000 inhabitants
Annual expense in mobility	(none)	1000 EUR

4 Analysis framework

4.1 Cross-check of the data

Two methods were combined to analyse the data availability and the difficulties observed during the data collection activities. Firstly, the authors had an opportunity to cross-check all of the collected data to ensure the quality of the collected data. On the course of this, data availability was analysed.

4.2 Questionnaire survey with participating institutions

A small questionnaire survey was carried out with the 12 participating institutions after the completion of the data collection activities so that the perception of the local experts was in charge of the data collection can be collected. Key questions were (1) if the participating institution has experienced a similar data collection before, and (2) what types of difficulties each institutions experienced during the data collection practices. All of the 12 participating institutions responded to all of the questions.

5 Analysis result

5.1 Experiences in data collection

Two-thirds of the participating institutions had some experiences in collection of mobility data at the institutional level as summarized in Table 4a. Yet all kinds of experiences are on an one-time basis and is not based on a time-series collection. The types B and C in the table are the ones that affected by the needs of the project or research works rather than the data needs for mobility plans, and these causes some important indicators being not collected.

Table 4 Previous experiences in mobility-data collection

Type	Type of previous experiences	No. of participating Institutions
A	Previous mobility plans/strategies for core city	4
B	EU-Project focusing on mobility	3
C	Scientific works	1
D	None	4

5.2 Availability of data

Data availability status was coded into the 8 groups as listed in the header of Table 5. The availability for each indicators is summarized in this table, represented by the number of participating institution that falls into each availability status. The usefulness of the data in each availability status was assessed in the context of the SUMP, and it is included in the Table 5 right below the header.

Table 5 Number of participating institution by availability situation of mobility indicators

Indicator \ Availability status	Available from recent survey/statistics	Data/representative statistics available from part of the FUA	Data only for the core city within the FUA available	Data/representative statistics only for the whole FUA available	Substitution by regional representative statistics	Substitution by national representative statistics	Substituted by expert guess	Not available at all
Usefulness of Data with each availability status	Very High	High			Middle		Low	
Modal Split	3	1	2	1	1	0	2	2
Purpose of trip	2	1	2	1	1	0	1	4
Avg. travel time	2	1	0	0	0	0	1	8
Avg. trip distance	2	1	0	0	1	0	1	7
Motorization rate	8	0	1	1	0	0	0	2
Annual expense in mobility	3	0	0	0	1	1	0	7

The data about the motorization rate is to a large extent available: this is not surprizing as the data typically comes from the vehicle registration. The data about modal split and trip purpose are available to some extent at around half of participating institutions, but at the rest not. Data about travel time, trip distance and the annual household expenses in mobility tend not to be available at large. These tend-not-to-be-available one are, however, the key indicators when it comes to plan the packages of the measures for sustainable transport.

5.3 Other difficulties observed in the data collection activities

The questionnaire survey included a question asking whether certain types of difficulties are observed by each participating institution or not, subdivided by the five data groups as summarized in Section 3.3. The result of the main types of difficulties observed are summarized in Table 6. The obvious difficulties observed by many participating institutions as for many types of the data except for the demography data group are [A] to find an appropriate and reliable data source. As for some data types, many participating institutions felt it difficult [D] to find a substituting data source such as regional or national statistics. In fact, 9 out of 12 participating institutions stated either or both of the [A] and [D] as for the mobility data. The remaining three stated in the free-format response that data was not available as there has been no survey so far (two responses) or ongoing at an upper-level authority (one response). Furthermore, all participating institutions stating [C] stated [D]. This implies that, for all participating institutions, finding an appropriate or substituting source for mobility data remain a difficult or impossible task so far. Nevertheless, for all data groups, from the result of [E], the needs of the data are well understood among the participating institutions and from the result of [A], mere a few had a difficulty to find a local expert. The result of [F] implies that, in some cases, there is even seldom "feeling" of the situation, and the needs of the survey is implied by here as well.

Table 6 Summary of difficulties observed by participating institutions

Code	Type of difficulty	# of participating institutions by data group				
		Demography	Urban data	Urban facilities	Transport infrastructure	Mobility
A	To find an appropriate local expert	3	3	3	1	3
B	To find an appropriate and reliable data source	4	9	10	7	7
C	To access to the data (e.g. time-consuming formal data request process.)	1	5	5	5	4
D	To find a substituting data source e.g. national statistics	2	4	5	3	6
E	To understand why each indicator is important and/or needed	3	3	4	3	3
F	Feeling unsure to carry out expert guess when the data is not available	2	3	3	2	3

6 Conclusion

Through the research accompanying mobility-related data collection by 12 participating institutions, we analysed the availability of the mobility data and the difficulties observed by them. Learning from this research has a great significance in South Eastern Europe (SEE) as different types of the territorial authorities are covered. The key implications are as follows.
Although the participating institutions has some experiences in data collection, they are at most on one-time basis, and many feels it difficult to find appropriate or substituting data sources in mobility. This is probably common among many territorial authorities in the SEE region, as the 12 participating institutions are not special cases and they are rather progressive ones in the region.
Data about modal split is to some extent available, while travel time and distance is not much available as reliable data among the participating institutions. This hinders the goal-setting other than the shift of modal share in the context of sustainable urban mobility planning, as the shift from motorized modes to the active modes (i.e. walking and cycling) as well as to the public transport cannot be evaluated.
Systematic and regular mobility survey is generally in lack. If such data is available at national or regional level, the access to the data seems very complicated. In the context of SUMPs, the lack of regular survey in the region means the limitation of monitoring during the implementation phase. It seems that SUMPs are popular with a clear guidance by the EU in the region, while the lack of the systematic mobility data collection leads the SUMP at a risk that the SUMP will end up mere as a planning document, not being evaluated without appropriate monitoring.
Regular household travel surveys with comprehensive area-wide coverage call for lots of resources, while starting such survey from large FUAs can be a recommendable solution. An EU- or national-level initiative for knowledge-transfer and guidance about the mobility data collection (travel surveys) in this region is also recommended.

Acknowledgements

This accompanying research was carried out within the CHESTNUT project – CompreHensive Elaboration of STrategic plaNs for sustainable Urban Transport, co-funded by European Union funds in the framework of INTERREG Danube Transnational Programme.

References

[1] Marchand, B.: French Urban Planning and Sustainable Development, Toshi-kagaku Kenkyu (Journal of Urban Science), 2, pp49-54, 2008

[2] Wefering, F., Rupprecht, S., Bührmann, S., Böhler-Baedeker, S.: Guidelines – Developing and Implementing a Sustainable Urban Mobility Plan, European Commission, 2013.

[3] May, A.D.: Decision Makers' Guidebook, University of Leeds, 2003

[4] Shibayama, T., Emberger, G., Lemmerer, H.: Travel Behaviour Data Needs and Potential Roles of ICT in Data Collection, 13th World Conference on Transport Research (WCTR), Paper No. 2873, Rio de Janeiro, Brazil, 15-18 July 2013

[5] Shibayama T., Lemmerer H.: The role of ICT in travel data collection, Deliverable D4.2 of COMPASS project co-funded by FP7, TRI – Edinburgh Napier University, Edinburgh, 2013

[6] Akkermans L., Maerivoet, S., Schulz, A., Redelbach, M., Ahern, A., Vannacci, L.: Harmonization of national travel surveys in Europe, D2.2 of OPTIMISM project co-funded by FP7