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A HANDBOOK AS BASIS FOR THE MOBILITY SURVEY 2013 IN AUSTRIA

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For the nationwide mobility survey 2013 in Austria the Ministry of Transport commissioned a team of universities and consultants to develop a handbook for standardised survey procedure. With this handbook as basis, existing and planned surveys on regional level and in the Slovakian neighbouring area will be harmonized at a high quality level. Mobility data collected will be comparable as using the same collecting procedures and contents of the survey. Nevertheless there is sufficient flexibility in the survey concept. Based on the basic data sets and basic methodology defined in the handbook, different regions can explore more detailed or further information, when carrying out their surveys. The newest technologies supporting mobility surveys have been analysed with regard to their feasibility to be integrated in a large scale survey for the year 2013. Therefore the survey will not only provide the urgently needed data but also will increase knowledge on the latest survey technologies in Europe.

Keywords: standardised mobility survey, handbook, mobility data, Austria

1. Introduction

The last Austrian-wide mobility survey dates back to the year 1995. Missing current mobility data on national level impose a serious dilemma on all transport planning activities, as transport prognoses more than 15-year into the future must be made to characterise present traffic conditions and mobility behaviour in Austria. Therefore, the Austrian Ministry of Transport commissioned a consortium under the leadership of the Institute for Transport Studies to develop a handbook as basis for the call for the new mobility survey, which is planned to be implemented in the year 2013 [1]. The study includes analysis of the newest technical developments for surveying, such as the use of GPS-loggers, Smart phone applications or GIS-applications. Pros and cons of traditional and new survey methods are investigated aggregated to feasible data collection concepts. A data catalogue including future oriented contents like social environment, lifestyle, gender aspects, etc. is included and documented in the handbook. This data to be surveyed is structured in a basic question-set of the survey and potential extensions. The question set was derived based on a broad survey within the transport related business sector, the research community, the public sector and on analysing present and past mobility surveys, both in Austria and beyond.

A suggestion for a sampling method, data-weighting, data-updating and archiving, organisational issues of carrying out the survey, financing and data availability, etc. is included in the handbook as well. An important aspect is representativeness and comparability of the results of the survey planned. The method suggested is driven by the aim to achieve a high response rate (of above 50% as minimum requirement), as it is of utmost importance to reproduce the mobility behaviour of the complete social strata quantitatively and in high quality. It was analysed, how multiple possibilities of survey methods could be combined within affordable effort and limited costs, also in the view of data privacy protection. Possibilities of a continuous mobility survey are discussed in alternatives. The handbook is the foundation of a future oriented data basis, urgently needed for mobility research and transport planning in Austria and beyond.

In parallel, some Austrian provincial states conduct their own mobility surveys on regional level on a regular basis. It is important to standardise these surveys under involvement of all relevant stakeholders. This allows including the provincial surveys into the national mobility survey as well as to guarantee their comparability and therefore increases the efficiency of the different surveys. This can be guaranteed either if the survey will be carried out as one project or the survey will be implemented in parallel using the same data catalogue, variables, and coding schemes based on the handbook.

2. Goals and Requirements to the Survey

The results of the survey will serve different issues in relation to transport planning and related disciplines. The major requirements on the results of the survey are defined. The database will be used:

- as basis for monitoring and evaluating trends in transport demand, policies and action taken as well as management tools and measures implemented,
- as database for environmental monitoring programs,
- as basis for simulation and modelling of existing and future transport demand,
- as basis to discuss the actual situation related to gender issues and gender budgeting,
- as basis for decisions of future transport measures and projects.

Additionally the survey is embedded in various other surveying activities, therefore some framework conditions need to be considered, if drafting the survey concept. First of all data should be comparable with the last nationwide mobility survey, which took place in the year 1995. Another issue is the relation to regional mobility surveys. Especially the provincial states have some tradition of carrying out similar surveys. It should be considered how such surveys can be embedded in the nationwide survey (even if time gaps are in between). Ideally, if activities are carried out in parallel and coordinated as sharing of the fixed costs of the survey could be achieved that way. An important role played the technical development, which took place since the last survey. It was a special request by the ministry to screen actual technical developments with regard to their feasibility for a large scale survey. This concerns mainly the usage of GPS or similar localization tools, GIS based map tools, web based survey tools, smart phones for the survey procedure and the usage of mobile phone cell information for route tracing. Finally, the mobility data collected in the nationwide survey should serve as starting point for in-depth surveys for specific topics of interest. For example, transport users can be screened after a specific variable either socio demographic related or related to his/her transport behaviour.

3. Survey Concept and Size

As a first step, delineation with regard to the content of the survey was made. Most important principles are as follows:

- person mobility of all inhabitants registered in Austria with an age of minimum 6 years are to be surveyed; usually children below 6 years are not carrying out unattended trips and therefore will be reported by others under category “the trip was made together with:”,
- the sample includes a full household to be able to analyse the household context of the mobility,
- all persons in the sample should report their mobility at 2 predefined days,
- both mobility of working days and work free days such as Sundays and holidays will be included in the survey,
- the survey will cover a full year in order to understand seasonal effects of transport demand.

In order to cover at least all nine Austrian province states 14000 households are envisaged to be covered in the net sample, which is ca. 30800 persons. This sample should be split over ten years starting with 6500 households in the first year and collecting data of further 2500 households in the third, sixth and ninth year. Additionally 230 households should be covered in each surveying period, which will use a GPS tool as extended pilot test and for gaining first GPS based data as reference. The sampling procedure will be stratified by the different provincial states in Austria, considering their different number of inhabitants and three different settlement types (urban, semi urban and rural).

Of course, this concept – which is also driven by the financial resources given – has some limits, the authors are aware of. The survey concept designed for the main part of the nationwide survey (excl. the GPS survey) will not deliver no or just incomplete data sets describing selected routes of trips, long term mobility patterns of transport users and individual mobility of children less than 6 years. Long distance trips both for business or holiday will be underrepresented as usually these groups may not be accessed by the survey more likely. Another limitation of the survey is the missing information with regard to trip pattern. For such information, a longer lasting reporting period up to 6 weeks would be necessary. Finally, foreign people not registered in Austria will not be covered in the survey.

On the other side, several in depth survey can be built up on the basic information collected. For example, respondents for interviews exploring the attitude towards the transport system and related issues clustered by socio demographic groups of respondents can be selected. Additionally the impact of the social status, gender role, responsibilities for other persons or the need of long distance commuting can be explored in a second step of the survey.

4. Standardization of Survey Content

The content of the survey was compiled based on a broad participation process of stakeholders, funders and potential users of the survey data. As the number of questions in the survey is limited the full list of requirements cannot be satisfied in just one survey. Therefore the content variables were structured in basic data, to be collected in any survey across Austria and specific questions to be included if special interest existed for specific areas. However the structure of the data needs to allow the merging of the data between the surveys carried out in the different regions [2]. This is important, if e.g. answer categories are collected in a bigger variety compared to the basic data set. For example, if additionally to the mode “car usage” the respondent is asked to mention the propulsion system as it can be diesel, petrol, electric, hybrid, etc. In this case the data need to be structured that way, the detailed data can be summarized to the basic variable mode “car usage” easily. In total 53 topics were identified, which required a number of 53 variables to cover this information. This causes 111 questions, for those a catalogue was drafted in the handbook, in order to use standardised wording for collecting the same information across different regions. As an example, Table 1 shows the approach for the categorisation of the variables for the mode public transport, subcategory bus and further potential subcategories.

Table 1. An example from the standardised categorisation catalogue for variables, taken from the handbook for mobility surveys developed [1]

Public transport	Bus	Urban bus
		Urban trolley bus
		Regional bus
		Regional trolley bus
		Coach (long distance)
		Bus on the demand
		Company owned commuter bus
		School bus
	
	

5. Survey Technologies

Based on a literature research, stakeholder interviews and the know-how of the project partners potential technology was screened with regard to the potential application for the survey. Technology could serve to improve the data quality, simplify the data analysis, avoiding systematic errors and increasing the response rate (especially within the group of people attracted by new technologies).

For this the usage of GPS loggers is a promising tool to simplify the collection procedure [3]. However due to privacy concerns of the surveyed people, practice tests show the respond rate is below average [4], [5]. Additionally the data observed need to be analysed together with the surveyed people to add further attributes to the trip and to develop the trip chain. This causes additional effort for the surveying organisation. Split of the movements over the day into different trips with origin and destination is a still open and challenging procedure [6]. Therefore, the conclusion for the next nationwide survey is to use a sub sample only. Here, more experiences in using this tool can be made at the same time not endangering the whole survey. Collected data can be compared with the main survey using other collection methods and correction factors can be derived. Already small pilot tests show, short and non motorised trips are usually forgotten to be reported, if not using GPS [7]. Another issue is to learn more about the route choice of people with the support of the GPS data.

Another interesting aspect is the potential of using a web based questionnaire. In Australia, the Netherlands and the US some experience exists. A big advantage of web based questionnaires is the possibility of better structuring complex questionnaires [8]. E. g. by filtering answers possibilities, combining the questionnaire with map applications, online checking the plausibility of answers [9]. The conclusion was to develop such a tool and offer respondents to use or not on voluntary basis.

The use of smart phones, with comparable functions such as GPS loggers but the option to integrate a kind of a web based questionnaire additionally is an overall promising approach for future

surveys. The application of the survey can be installed at the users own smart phone in this case. First pilot studies were carried out in Austria on this issue [10]. But there are some limitations, which make the usage of smart phones for a nationwide mobility survey not advisable at the current situation. First of all the privacy concerns of the respondents, the lacking capacity of energy supply of the smart phones and the little market penetration of smart phones in Austria so far. All these issues may be solved in the next decade, but for a survey with a planned starting date in 2013 the technology is not ready to use.

The usage of GIS based information for data collection is another technological advance in the last years. The usage in existing surveys is limited to professional staff during telephone or personnel interviews or during the data analysis to check location based information delivered by the respondents. There exist no broad experiences by usage of GIS maps directly by the respondents without further assistance by staff of the surveying institution. Therefore the usage of GIS based information for the nationwide Austrian survey will be limited to the staff of the surveying organisation.

The usage of cell phone information of mobile phone providers is another option. But it is clear, the data, which can be derived from this data base, is far too rough to be able to substitute a mobility survey at all [11], [12]. However the data can be used for plausibility checks and to impute long-distance travel data into the data set of the survey.

Finally, software assisting random dialling surveys was screened towards its feasibility. Generally spoken, the primary goal of the nationwide survey is to access the national register data to draw the sample. Random dialling procedure could serve as a second best solution, if the national register is not available because of the increasing gaps of telephone registers. There exists sufficient experience on this matter as market analysts use this tool for their work [13]. If there is a regional delineation of the respondent group, cell phone numbers are a problem, as no geographic assignment can be made [14]. On the other side the share of people possessing no fixed line phone is increasing rapidly. Therefore the proposed strategy is to start with random dialling of cell phones and just filling up missing areas with the fixed line numbers in a second step of the survey. This procedure allows an even distribution over a specific region. However, all cell phone users living outside of the surveyed areas have to be excluded after a screening question, which causes additional effort in a regional survey.

6. Survey Method

The survey will offer respondents several alternatives in order to submit the requested data, which are paper and pencil interview (PAPI), web based interview (CAWI) or computer assisted telephone interview (CATI), see Figure 1. This procedure should ensure a high response rate, which is important to achieve highly representative mobility data of the target people. Over all, for any option a respondent may choose, there exists a standardised collection procedure. This includes a minimum number of six active contacts, if no data have been received, before the respondent is categorised as non responding person. A sub sample of this group will be included in the non response analysis, where staff of the survey organisation will make visits at home and try to collect some basic information of this group in order to be able to correct the sample.

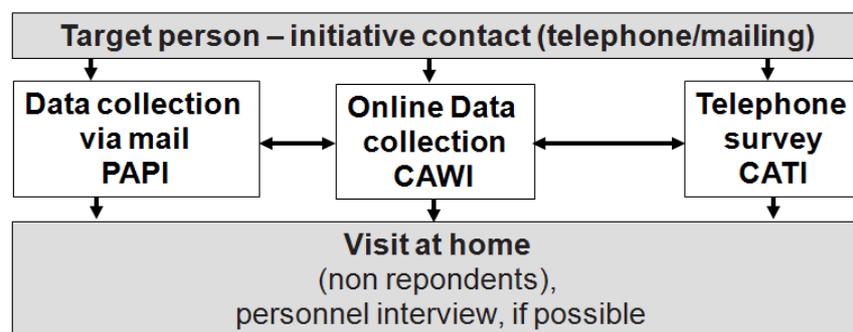


Figure 1. Options for respondents to deliver required data, main survey [1]

Table 2 shows the standardised procedure for data collection based on the example of paper and pencil (PAPI) survey as it is defined in the handbook. Preferred way of communication with the respondent is via telephone. For that reason, the survey company will screen the person of the drawn sample in existing telephone registers trying to find out his/her telephone number (as in the national

register telephone numbers are not included). If telephone numbers could not be identified, additionally the respondent is asked for his/her telephone number in the initial contact by mail. Especially this is precondition, if respondents prefer to deliver their data via telephone interviews. If random dialling is used, this procedure can be postponed. For the other two communication channels, which are web based and telephone interview, same standardised procedure are developed and documented in the handbook.

Table 2. Standardised procedure for PAPI (paper and pencil interview) data collection [1]

related to first reporting day	contact	activity
-4	mailing	Sending out questionnaire
-3 until -1	telephone	Contact for motivation and recalling the requested activity (data collection)
+3	tel. or mailing	Contact for motivation and recalling the requested activity (sending back data)
+10	tel. or mailing	Contact for motivation and recalling the requested activity (sending back data)
+17	tel. or mailing	Contact for motivation and recalling the requested activity (sending back data)
+24	mailing	Resending out questionnaire, new reporting days
+25	tel. or mailing	Contact for motivation and recalling the requested activity (data collection)

7. Privacy Issues

Because of the existing Austrian law on data protection (based on legislative European framework), some requirements with regard to the data collection activities need to be satisfied as collected data are related to individuals. In specific cases these data are sensible data, e. g. if people deliver information with regard to their health condition, religion or political attitude. This is also an issue, if anonymous data (where person name is deleted) can easily imputed again by legal data mining procedures. For example, if the address and the profession are known of an anonymous person, the name could be imputed based on public registers. Therefore address data and – if using GPS loggers – the exact starting point and destination of a trip need to be blurred after necessary attributes, such as the trip length are identified. Usually the spatial data are clustered to bigger cells anyhow in a second step, where this information is detailed enough for any application. With regard to coordination information, this could be made by cutting last digits of the coordination data.

All respondents need to be informed about their privacy rights, e. g they can retract their cooperation at any time and data need to be deleted. Only in case, the data are already summarized to a higher aggregation level, where the specific individual cannot be identified anymore, these data need not to be modified. Following information need to be included in this information letter as well: the reason of the survey, the usage of the data and which organisations will have access to these data. A template for a standardised information letter has been worked out during the preparation phase of the nationwide survey and is documented in the handbook.

8. Transnational Cooperation

As the capital of Slovakia, Bratislava is located within commuting distance to the capital of Austria, Vienna this area is closely linked together from the mobility prospective (Figure 2). So, there is some interest to include this region in a common survey to be able to model the international traffic in this region, as Slovakian citizens travelling in Eastern Austria are not covered in a nationwide Austrian survey. Similar to this area the city of Salzburg with its interrelations to the Southeast of Bavaria (Germany) and the Rhine valley, provincial state of Vorarlberg, with its neighbouring regions in Southern Germany and the East of Switzerland including the principality of Liechtenstein show comparable situation. But contrary of these regions, Slovakia never carried out a large scale mobility survey since the fall of the communism

and therefore the lack of data is the major current problem in international transport planning. Therefore with the support of the European Development Fund (Cross-Border Cooperation, Slovakia – Austria 2007–2013 project EFRE) in parallel to the Austrian survey a net sample of another 17000 persons in the Slovakian districts of Bratislava and Trnava will be surveyed commissioned by the Slovakian Ministry of Transport under supervision of an international project team. In this team the technical universities of Bratislava and Vienna, the University Bodenkultur Vienna and both ministries of transport are included. For this survey the handbook has been translated in Slovakian language and the survey will follow the guidelines of the handbook. To further densify the knowledge, a special survey will be carried out at the border stations (all modes), where another 10000 interviews will be carried out. These data will feed the results of the nation-wide survey as well as an international transport model for the twin city region Bratislava and Vienna.



Figure 2. The areas covered with the cross national mobility survey as part of the nation-wide mobility survey in Austria

9. Conclusions

The project is complex and ambitious as many players are included meanwhile, the provincial states, the ministries and universities of two countries. Preparations for the call for tender are on their way and will be fixed by autumn 2012. Nevertheless responsible project partners are confident the project will meet the goals and the information quality on mobility demand will be improved in a near future benefit from the data collected. Additionally, with the aim of integration of new technologies, such as the sub sample using GPS technology, providing a web based survey and offering different options to the respondent how to deliver data will be a contribution to survey technology and methodology as well.

The institute for transport studies, which is responsible for data and process quality of the survey, is also integrated in a COST action SHANTI (Survey Harmonisation with New Technologies Improvement). So, there is some chance to further develop the standardisation effort done on national level to spread out these experiences on international level. As a first practice test parts of Slovakia will prove the feasibility of the survey concept originally developed for the Austrian market only.

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