🏆 *reviewed paper*

Online SP-off-RP Travel Surveys for Identification of Target Group Specific Measures and Uptake Potentials in Rural Municipalities – Learnings from the Pilot Case Feldkirchen/Donau

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1 ABSTRACT

Planning processes are often fed with various streams of data, experiences and knowledge from different stakeholders involved. Especially the user perspective and acceptance of possible solutions can be measured through different qualitative or quantitative approaches. To allow a certain level of objectivity, comparability and accuracy, structured and standardized quantitative data collection methods are needed to collect mobility behaviour data. In this context questions regarding financial and capacity-related feasibility of certain innovative methods for local municipalities in rural context arises.

This paper discusses possible scenarios for enhanced collection of mobility behaviour data (stated and revealed) to enable target group specific development of mobility measures in rural contexts. On the example of a "Mobilitätswerkstatt" and an accompanying travel survey via the "mobyome-App" realized in Feldkirchen/Donau (Federal state of Upper Austria), outcomes and possible use of data and insights are discussed. Further on the trade-offs between usability, length of the travel survey, representativity and financial feasibility will be explored.

The mobyome-App, developed by the team of mobyome KG[1] – an impact-oriented company based in Vienna and Linz (both Austria), tries to combine an SP-off-RP approach on trip-leg level with an Web-App interface which allows to keep the technological burden as low as possible.

As the mobyome-App was used in the rural municipality of Feldkirchen/Donau[2], around 5% of the inhabitants fully participated in the data collection. In the paper first insights on detailed response rates, identification of possible user groups for future mobility services like ridesharing-applications or the willingness for behaviour change will be discussed. On the example of Feldkirchen/Donau, the paper will showcase possible (future) analyses based on the obtained data.

Keywords: Survey, Behaviour change, Mobility, Rural, Web-App

2 BACKGROUND

The success of a radical shift in the mobility behaviour in Austria to meet national (e.g. Austria's 2030 Mobility Master Plan[3]) and international goals (e.g. the Paris agreement) on climate protection will be decided in rural areas, where also a large share of THG-emissions are generated.

Substituting the private car in rural areas by a well-integrated system of alternative mobility solutions like demand responsive transport, Car-Sharing or ridesharing (when trying to reach comparable levels of comfort, flexibility, ..) based on an attractive public transport and dense network for active mobility appears to be an immense challenge in implementation.

2.1 Common data basis

To allow the strategic coordination of a complex network of necessary actors to build up this system (local municipalities, federal administration, regional mobility management, private initiatives, …), a regular local data basis on the status quo and changes in mobility behaviour are essential (see also Aschauer 2019 for further argumentation). This demand side - data enables evidence based planning processes (for example like showcased in the ACTIVE8[4] project, see Hackl et al. 2019), impact measurements of implemented alternatives and learning process in general.

[1] https://www.mobyome.at/ueber-uns
[2] See https://feldkirchen-mobil.at/ for further insights including mobility-info sheet and analysis of status-quo
[3] https://www.bmk.gv.at/en/topics/mobility/mobilitymasterplan2030.html
[4] https://projekte.ffg.at/projekt/1412825

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The availability of detailed and large datasets (<5% of inhabitants) on municipal/local level in rural areas in Austria, using a trip-leg approach including geocoding, is scarce, only several singular surveys are known like Melinda[5], Smart Survey[6] or SmartMo/MASI-Active[7].

2.2 New tools for travel survey – recent developments

Looking into the "technological side" of recent developments in the field of travel surveys, smartphone based approaches gained more and more attention – especially when showcasing drastic changes in mobility behaviour during various COVID-19 phases (e.g. MOBIS[8], MOBICOR[9] or TravelVU[10]). Still there is a certain insecurity in the possible response rate using smartphone based approaches (Molloy 2021).

From the methodological setup chosen in travel surveys, the combination of stated preference (SP) with revealed preference (RP) of route and/or mode choice is still a novel and innovative approach. Rudolf and Straub (2021) showcase their approach on the MyTrips application, where fast parallel calculation of alternative routes for the individual RP-experiment where essential.

Technologies like smartphone-based data collection or web-based interviews can be seen as enablers for more detailed and objective travel surveys. As smartphone-based solutions need higher early investment setting up the specific system, marginal costs stay low due to high levels of automation and easy scalability while keeping the survey load low (depending on the level of amount days to be validated) for participants.

For the usage on local level, web-based interviews can offer a good trade-off between cost, survey load and data quality / level of detail / automation possibilities (see Hubrich 2017, 255f). The mobyome Mobility-App try's to focus on this hypothesis, adding also the possiblity to gain information on stated preferences regarding existing (but not yet used) and possible (to be implemented) mobility options.

2.3 Mobyome – an impact oriented company

As mobyome focuses on generated impact before financial benefit, measuring this impact of activities is a core necessity for all projects. Mobyome develops visions, ideas and tools for a new understanding of alternative mobility solutions in small towns and rural communities. We cooperate with like-minded people from politics, research, business and civil society and support communities with our expertise.

3 PILOT-CASE FELDKIRCHEN

In the following chapter an insight into one application-example of the mobyome Mobility-App in the context of a Mobilitätswerkstatt[11], realized by mobyome together with local partners in the first half year of 2022, will be given.

3.1 Local context

Feldkirchen/Donau is a municipality with 5 426 inhabitants (2022[12]), located in Upper Austria, 20 km into the west from Linz, the capital of the federal state. Main public transport links are the local train line Linz-Aigen-Schlägl and bus lines to Linz, Aschach and Berg.

The municipality is part of the "Klima- und Energie-Modellregion Urfahr West" (KEM UWE)[13], a regional intermediary institution which supports climate friendly activities and gives access to funding possibilities. The described process was financed aswell as supported by the municipality itself and the KEM UWE as a lead project.

[5] https://www.fhv.at/forschung/business-informatics/laufende-projekte/melinda/
[6] https://www.ait.ac.at/loesungen/sensing-travel-behavior/smart-survey/
[7] https://boku.ac.at/fileadmin/data/H03000/H85000/H85600/Forschung/KOMOD/1130_SmartMo_Masi_Activ_.pdf
[8] https://ivtmobis.ethz.ch/mobis/en/
[9] https://www.infas.de/neuigkeit/mobilitaet-und-corona-wie-veraendert-sich-der-alltagsverkehr/
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[11] https://www.mobyome.at/angebot/mobilitaetswerkstatt
[12] https://www.statistik.at/blickgem/G0201/g41606.pdf
[13] http://www.regionuwe.at/

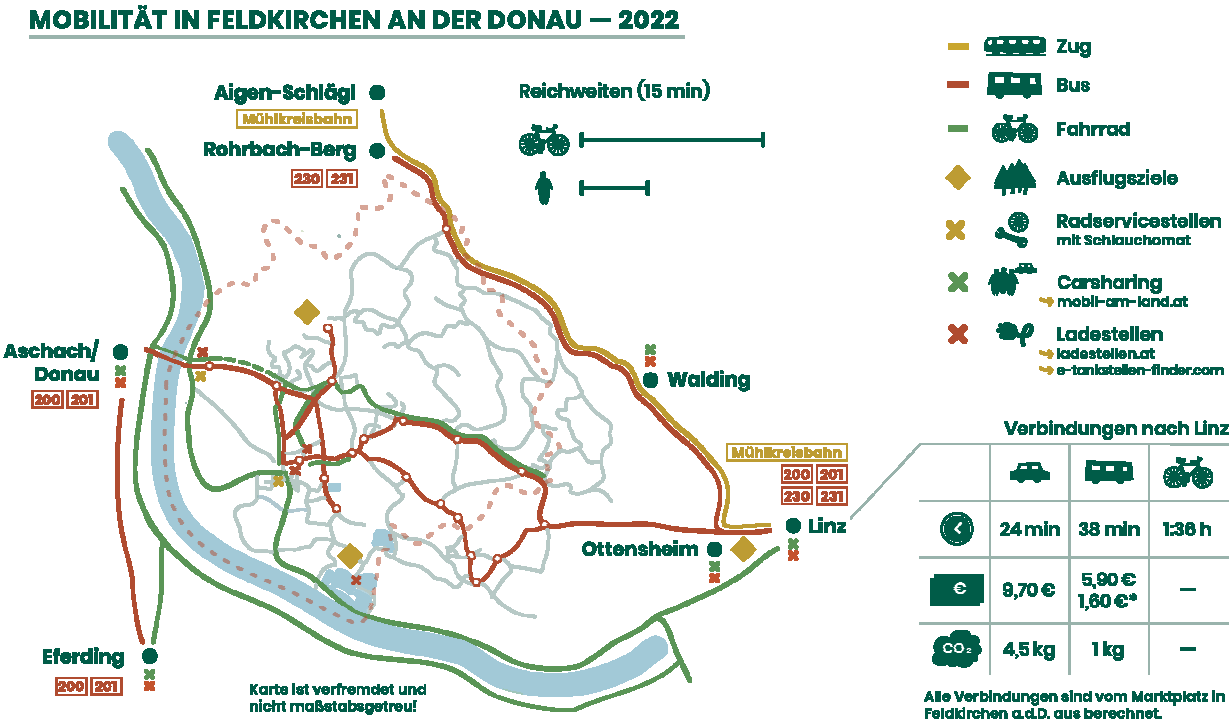

Figure 1: Cutout of Mobilitätsinfoblatt

3.2 General Mobilitätswerkstatt process

The Mobyome Mobilitätswerkstatt consists of several tools (including the Mobility-App) and formats which all aim at the following goals:

- Create awareness of one's own mobility and the associated costs
- Getting to know alternatives for personal mobility and making the consequences visible
- Collectively and better present and communicate existing mobility offers
- Identify gaps for a sustainable transport system
- Creating an understanding of the collective dimension of mobility

Figure 2: On-Site event

The format and tools which were / will be applied in the Mobilitätswerkstatt Feldkirchen/Donau are, (M) marks if the Mobility-App is also used during the events :

- 20.01.2022 | Stakeholder Kick-Off workshop (M)
- 01.04.2022 | Event-stand (M)

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- 20.04.2022 | Intro-Presentation
- 01.03.2022 – 31.05.2022 | Mobility-App
- 05.-07.05.2022 | 3-days On-site event (M)
- 30.09.2022 | Final report
- 27.09.2022 | Final presentation

The Mobility-App can be seen as central backbone of the Mobilitätswerkstatt as all formats try to activate participants for the survey in the Web-App or it is used directly in the event using a live-analysis of the result concerning only the participants present on site (in a special workshop-setting representation). Accompanying to the formats stated above, intensive PR work via Social media, local newspaper, poster series was realized. Also multipliers were involved, re-posting the calls for participation.

3.3 Mobility App

3.3.1 Basic Setup and Approach

The Mobility-App is a web-based application, fully self-developed and designed by the mobyome team. The tool is accessible without installation via various devices and browsers, not being depended on operating systems and their limitations. The flexible and highly automated backend, using several external datasets like VAO[14] or basemap[15], allows a easy setup for all 2.093 municipalities in Austria.

Main objective and hypothesis of the Mobility-App is not to reach a representative sample to be able to extrapolate the overall mobility behavior from the subsample, but to gain deeper insights on target groups with high potential for behavior change.

The application consists of two types of views: the participants-frontend and the analysis view which can be accessed by the survey managers for single municipalities and/or workshops facilitators.

3.3.2 Survey elements of the mobyome Mobility-App

The survey implemented in the participant-frontend of the Mobility-App consists of

- the self-reporting of routes, modes and start/end time for trip-legs of an typical day for the participant (routine-trips) via an interactive online-map using multimodal routing for easier usability (revealed preference)
- questions on alternative existing options (based on VAO, mobil-am-land.at, ...) for single personal trip-legs, following a cascading logic for choosing sustainable alternatives until either one option is chosen by the participant or all relevant options are declined. (stated-preference)
- questions on alternative possible options (Car-Sharing, demand-responsive transport, ...) for single personal trip-legs, following a cascading logic for choosing sustainable alternatives until either one option is chosen by the participant or all relevant options are declined. (stated-preference)
- detailed information on available household-vehicles (also connected to information given in the trip-legs)
- basic demographic and household information
- contact information if the participant wants to stay informed or/and adjust/access his answers / results still later on

The survey includes several informative texts which are connecting results of the single participants with available overall statistics on cost or emissions in Austria or the municipality as a benchmark. Basically the given framework can be easily adapted and connected to new data sources for even higher levels of automation.

[14] https://www.verkehrsauskunft.at/
[15] https://basemap.at/

3.4 Insights on response rates, outcomes and possible automated analyses

3.4.1 Participant statistics

Overall 4,6% of the population registered in Feldkirchen/Donau fully participated in Mobility-App survey (see Figure 1). Inhabitants older than 65 an younger than 15 are unrepresented in the sample .

Number of participants	Share	Status
376	100%	Survey started
289	77%	Revealed preference realized
268	71%	Analysis finished
260	69%	Stated preference realized
250	66%	Full survey finished

Table 1: Response rates on various survey stages

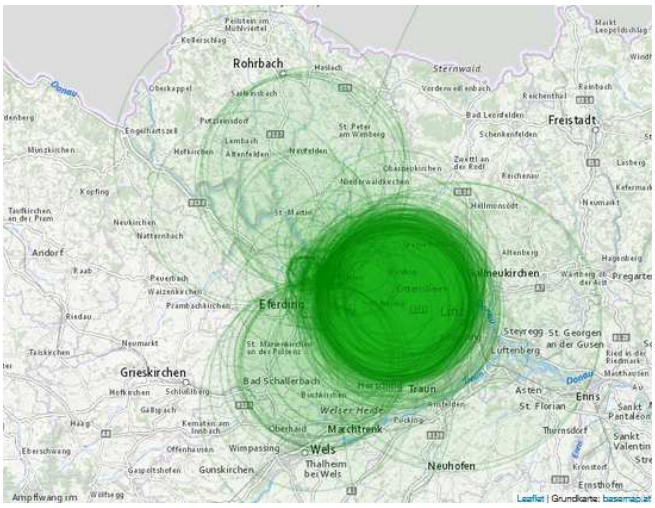

Figure 3: Radius of Action

The share of woman and men in the sub-sample reflects the share in the overall population in Feldkirchen/Donau, one person stating a divers gender status also participated in the survey.

For the average participant it took around 9 minutes to complete the survey, which showcases that the Mobility-App can also easily be used in workshops contexts as the completion doesn't take too much time.

For all 7 main settlement areas at least 20 participants could be activated, also covering decentral parts of the municipality.

3.4.2 Fully automated geographical analyses

The analysis view allows plotting certain mappings based on Leaflet[16], an open sources JavaScript library for interactive maps. This can be used as more qualitative and illustrative basis for discussion processes on site (e.g. to showcase the radius of action based on the stated trips – see figure 3). Further interactive maps like plotting of routes for certain accepted alternatives allow to come up with hypothesis for further, in depth on site analyses like traffic counting, passenger surveys or traffic flow observations.

3.4.3 Target-group specific measures

Based on revealed preference: For reported car-trips, potentials for ride-sharing regarding routes and time can be identified. Participants with stated willingness for ridesharing can be further structured to identify a specific target group with an expected high impact of communicative measures promoting ridesharing offers. This communication can be combined with statistics on local car usage and expenses as directly stated in the Mobility-App by 14% of the participants.

[16] https://leafletjs.com/

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Based on stated preference: As participants accept certain alternatives, for example biking, they are also asked to name possible supporting activities which would allow the realization of this mode change. This entries can be clustered and trip-legs they are connected to analysed (for example where and for which type of users improvements in bike infrastructure could be useful).

3.4.4 Uptake potentials

To identify potentials for behaviour, change within the participants, stated preference data can be used. The lowest acceptance rate was reached by public transport connections (built up from walking and public transport trip-legs) being suggested as alternative for private car trip-legs (48/279). For 144 trip-legs a too long travel time was stated as hindrance from using public transport.

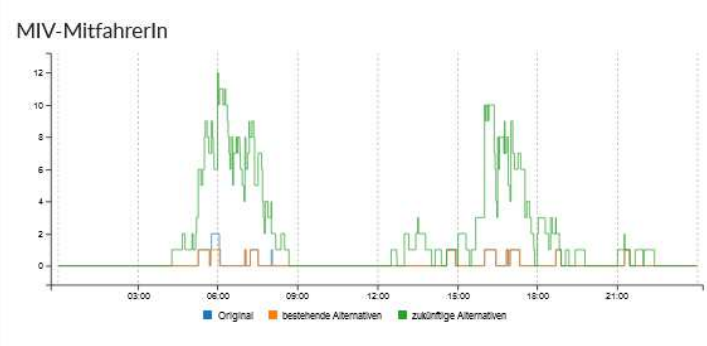

Figure 4 Time wise ridesharing potential.

The highest acceptance rate was reached for demand responsive transport (17 out of 26 trip-legs were substituted), directly followed by ridesharing with 102 out of 161 trips being accepted to be realized by ridesharing instead of using the private car. This potential can be mapped (looking into possible routes for ridesharing) and visualized time wise (see Figure 4 timewise ridesharing potential).

4 LEARNINGS AND REFLECTIONS

During the Mobilitätswerkstatt Feldkirchen various type of data was collected, from structured quantitative data from the Mobility-App towards more qualitative data from interviews and talks with inhabitants.

Only a small amount of possible analysis was realized and still big potential lies in finding further connection in the data. Three main reflections stay open for further discussion, development and collaboration:

4.1 Trade-offs between travel surveys and awareness rising

When combining a travel survey with ideas from awareness rising strategies for behaviour change in one tool, certain trade-off has been taken into account. The Mobility-App had to be well balanced between input asked by the participants and information given back to reduce the perceived survey burden. This on the other hand reduces the amount of data being available on the person itself, for example values, lifestyles etc.

In the further development of the Mobility-App following the experiences with first possible analyses from the data obtained this will have to be balanced out again, maybe taking into account new questions for better segmentation of participants.

4.2 Needed optimisation in algorithms and logic model

The algorithms for setting the SP-off-RP, choosing the order of alternatives which are suggested for participants, still reach certain borders in special cases. Especially the variables for public transport suggestions need to be adapted to create alternatives which show higher acceptance rates here (which will lead to a higher amount of ridesharing suggestions for example).

Further on the logic model for the order of most sustainable alternative for certain trip-legs needs to be adapted, especially readapting the role of motorbikes as alternatives.

1.1 Blended participation – how to better connect the digital and analogue methods?

As stated in 3.2 General Mobilitätswerkstatt process, the Mobility-App was used in analogue settings where participants were asked to fill in the survey. In the workshop settings a discussion of the results, having a

look on the analysis view, was moderated. Until now it is not possible to feed analogue data obtained into the Mobility-App system, linking for example collective mapping exercises during workshops back into the digital world. A possible topic to connect the digital and analogue world could be ideas for improvements for active mobility on certain routes in the street network.

5 CONCLUSION

While large-scale, representative travel surveys like Österreich Unterwegs or surveys realized by federal states still will allow to have a consistent long term comparison on the mobility behavior, new tools are evolving which allow additional, more agile approaches for combined mobility monitoring and awareness rising. To support local municipalities in obtaining a better local data basis for their decisions in the field of mobility-related measures, regional actors and federal states can play an important role in building up monitoring infrastructures (financing the setup costs) for measuring mobility behavior which can be used by the municipalities only covering the marginal cost.

Web-App / online approaches like the mobyome Mobility App, MyTrips or others offer big potential to close this gap, making it possible to obtain necessary data for collective approaches for an integrated alternative mobility system for rural areas.

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