

Mobility Measures for Residential Buildings in Urban Areas – a Promising Investment?

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1 ABSTRACT

Numerous scientific studies prove that urban design and the transport system influences people's mobility behaviour. The range of infrastructure and mobility services in the direct vicinity of residential areas plays a certain role, because 80% of all daily activities start and end at home. In practice, it can be observed that the integration of mobility measures is becoming increasingly important in the planning of new housing developments, but at the same time little is known about the actual effects that mobility measures have on residents. Due to the lack of evaluation, it is difficult to assess to what extent those measures, such as high-quality bicycle parking facilities, free public transport tickets for residents, car and bike sharing or parcel stations within a housing complex, are target-oriented and can be seen as promising to encourage people to adopt a more environmentally friendly mobility behaviour.

As part of the diploma thesis "Integration and impact of mobility measures in the housing sector for the promotion of environmentally friendly mobility", mobility surveys were conducted with residents of several new housing developments in Austria (Salzburg/Vienna) in spring 2020. With the example of the neighbourhood "Quartier Riedenburg" (Salzburg) – a recently completed residential quarter with a wide range of mobility services – this paper provides first-hand information about which mobility measures are particularly important for residents. A comparative study of the actual mobility behaviour of the residents before and after they moved to Quartier Riedenburg is set out in this paper. For the first time scientific evidence of the impact and relevance of mobility measures in residential areas is proved.

Keywords: Mobility measures, housing sector, mobility survey, mobility behaviour, environmentally friendly mobility

2 INTRODUCTION AND MOTIVATION

In recent years, the integration of mobility measures in the planning of new housing developments has received greater attention. In Austria for instance, it can be clearly noticed, that the number of newly developed neighbourhoods with a focus on additional mobility infrastructure and mobility services is steadily increasing. Since scientific studies prove that urban design and transport systems have effects on people's mobility behaviour (e.g. Koszowski et al., 2019 or Ewing & Handy, 2009), there is high expectation that mobility measures in the direct vicinity of the residential areas have the potential to motivate residents to adopt a more environmentally friendly mobility behaviour. At the same time, however, hardly any research has been done to determine which of these measures are actually effective and seen as useful by the residents. There is huge demand for evaluation pointed out by all stakeholders (e.g. municipal administration, housing developers, architects, mobility providers...). More clarity on this topic is highly requested. Seeing this gap in research, the goal of the study was to get a clearer picture of mobility measures in the housing sector and their effects on daily mobility to derive recommendations for appropriate measures for new developments. This paper will focus specifically on the results of the mobility survey of Quartier Riedenburg (Salzburg), which was one of the study areas.

3 MOBILITY MEASURES FOR THE HOUSING SECTOR

There is a solid number of publications available to the public describing the most common mobility measures for the housing sector. Therein, measures address different means of transport varying from entirely infrastructural measures on the one hand to informative, service and incentive measures on the other. (Köfler et al., 2019; De Tommasi et al., 2014; Franz, 2019; Gehl, 2016; Braun/Reiter, 2016; Bai et al., 2018)

Figure 1 provides an overview of the most commonly used mobility measures in practice, differentiated by means of transport and by complexity of the measure (Krombach, 2020).

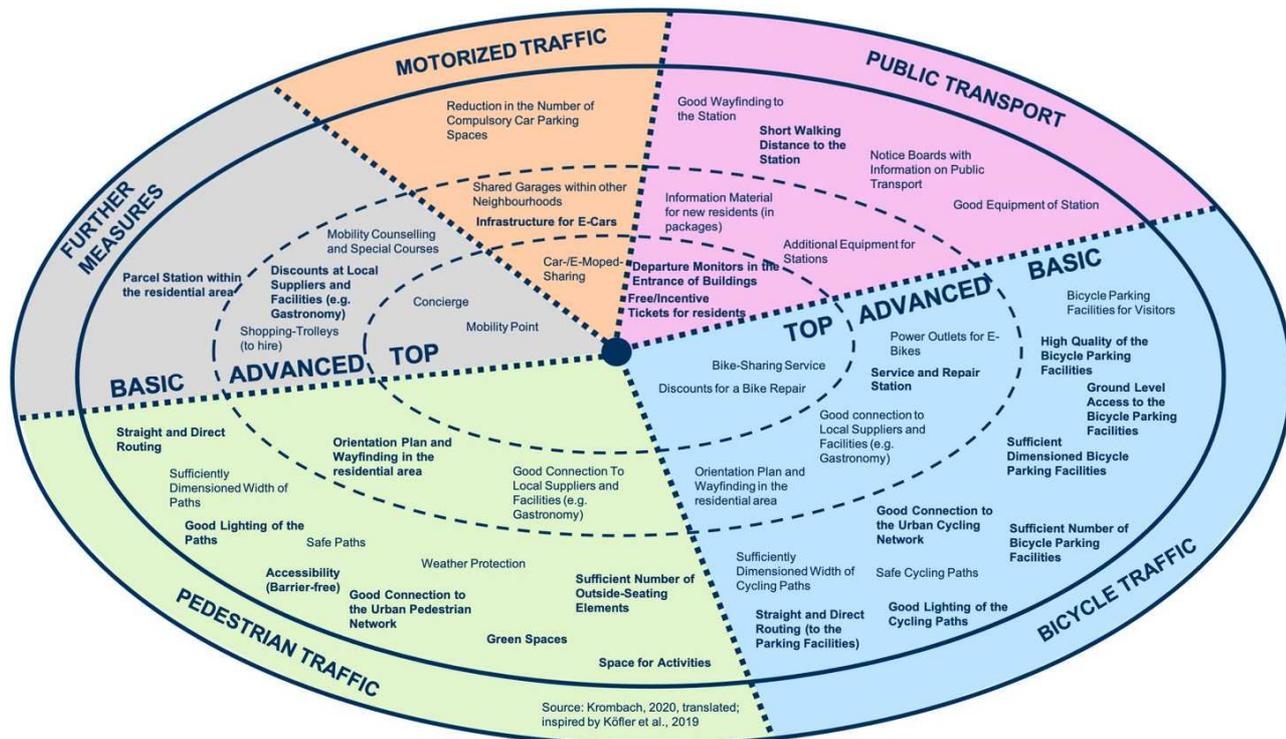


Fig. 1: Mobility Measures in the housing sector; Source: Krombach, 2020, translated; inspired by Köfler et al., 2019

4 STUDY AREA

The recently completed (2018/2019) neighbourhood Quartier Riedenburg (QR) is centrally located at just 1 km distance from the historic city centre of Salzburg. Quartier Riedenburg has 316 flats accommodated in 22 residential buildings, out of which 18 were developed by a subsidised housing company and four by a privately financed housing company. The area was chosen as an ideal study area since it offers a wide variety of mobility measures. This includes a car-free area in the centre of the residential area, a spacious park area open for the public and a uniform wayfinding and signage system within the residential area. In terms of bicycle infrastructure, there are more than 800 high quality parking spaces for the residents ranging from barrier-free inside parking spaces located in the entrance areas of the buildings to underground parking facilities (access by ramp or lift) as well as lockable bike pavilions. Furthermore, the neighbourhood has an excellent connection to the public transport system as a bus station is nearby. In terms of car parking, a shared underground parking garage was built for the neighbourhood. There has been a reduction of the number of compulsory car parking spaces. Additionally, there are also parking spaces for electric cars in the neighbourhood. (Krombach, 2020)

5 MOBILITY SURVEY

5.1 Preparation and organisation

In March 2020 a mobility survey was carried out in Quartier Riedenburg, targeting all residents aged over 18 years. Based on mobility questionnaires, such as “Mobility in Cities – SrV” (Hubrich et al., 2019) and “Active Mobility: Better Quality of life in Metropolitan Areas” (Gerike et al., 2020) a comprehensive questionnaire in paper format was developed, covering questions about the resident’s mobility behaviour before and after moving to Quartier Riedenburg. By comparing the results, it was possible to draw conclusions on whether there were actual changes in mobility behaviour after moving to a residential area with a wide range of mobility measures. Furthermore, participants were also asked to rate mobility measures by their importance. (Krombach, 2020)

5.2 Realisation and Data Processing

Since a full survey was intended to be carried out, all questionnaires were handed over at the residents’ front doors. Completed questionnaires were returned by residents via return boxes that were installed in a central

location within the residential area. To increase the response rate, an advertisement strategy with posters, website and an information day were pursued. Furthermore, there was email support as well as a telephone hotline available to all participants. Due to COVID-19 measures (lockdown) the face-to-face distribution of questionnaires had to be terminated from mid-March 2020 onwards, which resulted in a lower sample size than originally expected (see table 1). (Krombach, 2020)

Moreover, several drop out stages (see table 1) occurred over the course of the survey, which further reduced the sample size. These included Unit-Nonresponses, when residents could not be reached at their doors, did not return their questionnaires or when questionnaires failed the plausibility check. Item-Nonresponse resulted when there were individual answers that dropped out due to a lack of plausibility. (Steinmeyer et al. 2012; Hubrich, 2017)

	Quartier Riedenburg, Salzburg
Number of all Residents aged above 18 years living in the residential area	Number not available to the public (Number of Households: 316)
Number of Questionnaires handed over (at front doors)	229 Questionnaires (handed out to 140 households)
Number of Returned Questionnaires	82 Questionnaires (= 54 households reached)
Usable Questionnaires (after plausibility check)	82 Questionnaires (= 54 households reached)
Response Rate: usable questionnaires in relation to all questionnaires distributed	36 %
Response Rate: usable questionnaires in relation to all households living in the residential area	17 % of all Households reached (approx. every 6 th household)

Table 1: Response Rates of the Mobility Survey; Source: Krombach, 2020, translated

Overall, woman made up nearly two thirds (67 %) of the survey sample of residents of Quartier Riedenburg and men made up one third (33 %). The majority of all respondents moved to Quartier Riedenburg in the first year after the completion of the residential area (73 %). In terms of age distribution 32 % of all respondents are in the age group of 31-40 years, in comparison to the age groups of 18-30 years (24 %); 41-50 years (17 %); 51-60 years (13 %) and the group of 60 years and older (14 %). The majority of respondents live in a two-person-household (43 %), followed by 22 % who live in a single-household. (Krombach, 2020)

5.3 Effects on Mobility Behaviour

The results of the mobility survey show that the mobility behaviour of the participants changed after they had moved to Quartier Riedenburg in favour of a more environmentally friendly mobility behaviour. In general, there has been an increase in walking, cycling and in the usage of public transport while car usage has dropped (see table 2). (Krombach, 2020)

	Quartier Riedenburg, Salzburg (n _{max} =82)	
Car Ownership: car per household (before and after the move)	1,34 → 1,06	
Bicycle Availability: percentage of people who have access to a bicycle (before and after the move)	87 % → 82 %	
Ticket Ownership: percentage of people who are owner of public transport season cards (before and after the move)	33 % → 34 %	
Changes in Overall Mobility Behaviour: Frequency of daily use (Tendency after moving to the new neighbourhood)	by foot	Increase
	by bicycle	Increase
	by public transport	Increase
	by car	Decrease
General Usage of Shared Mobility Services: car or bike sharing	Before and after the move: (almost) no usage	

Table 2: Mobility Behaviour Before and After Relocation; Source: Krombach, 2020, translated

Moreover, it can be highlighted that the number of cars owned by a household dropped from 1,34 to 1,06. Although the average availability of bicycles slightly decreased (-5 %) after the relocation, it must be

emphasized that the percentage is still at a very high level. This may be because Salzburg is generally known to have good conditions for cycling (City of Salzburg, 2017). Regarding the ownership of season tickets for public transport, the percentage did not change significantly after the relocation. Finally, shared mobility services, such as car and bike sharing, seemed to be insignificant since there was (almost) no usage before and after the relocation to Quartier Riedenburg. (Krombach, 2020)

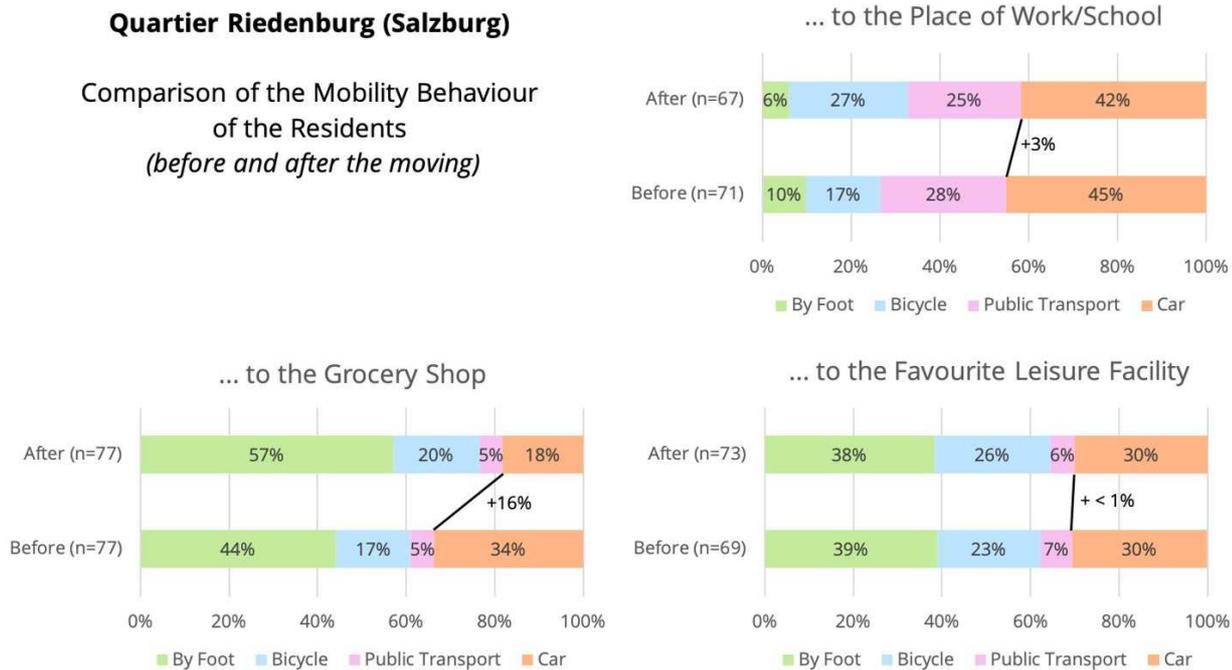


Fig. 2: Mobility Behaviour of the Residents of Quartier Riedenburg; Source: Own illustration, data from Krombach, 2020, translated

Figure 2 provides more details on the chosen means of transport differentiated by the journey destinations. It is clearly noticeable that the greatest shift in favour of environmentally friendly means of transport happened on journeys made in the immediate vicinity of the residential area (+16 %). This contrasts with journeys to the workplace or to school as well as to the favourite leisure facility, where there were only small changes in mobility behaviour measurable. (Krombach, 2020)

5.4 Rating Individual Mobility Measures

The second part of the mobility survey was dedicated to the importance of individual mobility measures. Therefore, the survey participants were asked to rank mobility measures by importance varying from 1,00 (not important) to 4,00 (important). (see figure 3)

Almost all pedestrian traffic measures were ranked (rather) important by the participants of the survey. With a mean value of 3,71 green spaces are especially important for residents. With regard to cycling, the seamless urban bicycle network access as well as quantity and quality of bicycle parking facilities are seen as essential by the survey participants. In terms of public transport measures, good connection to a nearby public transport stop was ranked outstandingly high. With a mean value of 3,74 this measure was the overall highest ranked measure. Considering motorized transport, only e-charging stations were viewed as rather important. In terms of future potential measures, parcel stations within the residential estates were stressed by the participants. Measures with less importance for the residents were sharing mobility measures (car, bike and moped sharing) as well as information packages for new residents and shopping trolleys for hire. (Krombach, 2020)

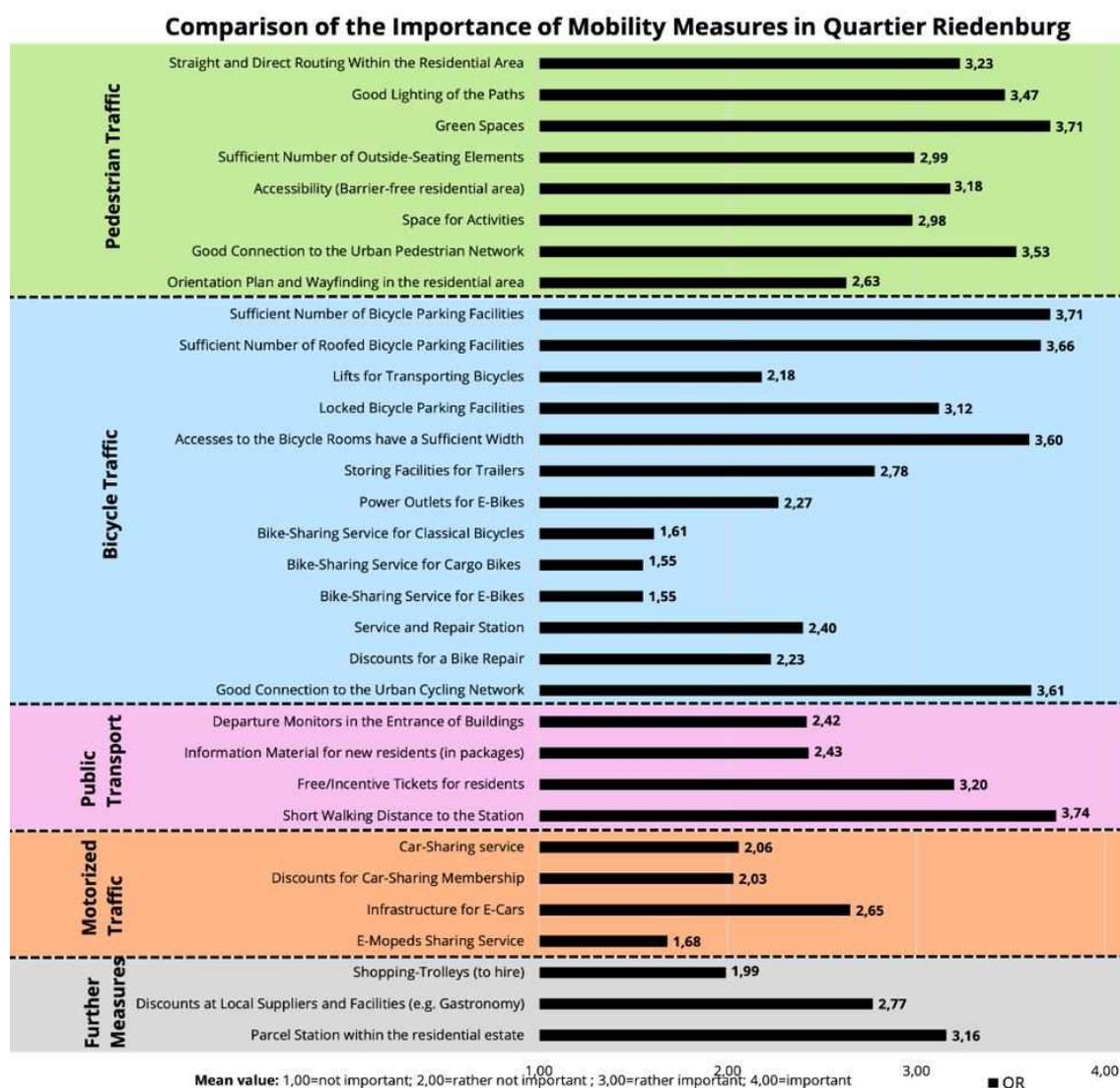


Fig. 3: Comparison of the Importance of Mobility Measures in Quartier Riedenburg; Source: Own illustration, data from Krombach, 2020, translated

6 CONCLUSION

With the diploma thesis (Krombach, 2020) the impact and relevance of mobility measures in residential areas was comprehensively analysed for the first time. The presented survey results on Quartier Riedenburg (Salzburg) show that with the relocation into a neighbourhood with additional mobility infrastructure and services the mobility behaviour of new residents has shifted in favour of a more environmentally friendly mobility behaviour. It led to an overall increase in walking, cycling and public transport use while the car usage and the number of owned cars on the other hand declined. A more detailed examination of the choice of means of transport revealed that the journeys in the immediate vicinity of a residential area are the ones which have the highest potential in terms of shifts to a more environmentally friendly mobility behaviour.

The comparison of the importance of individual mobility measures gives first-hand information on which measures are considered as promising by the residents and should be kept in mind when planning new housing. Within this study it is shown that (nearly) all pedestrian traffic measures, especially green spaces, are ranked highly. In terms of bicycle traffic, the connection to the urban cycling network as well as the quantity and quality of parking facilities are important. The overall most important mobility measure in the ranking turned out to be the availability of and proximity to public transport stops. Furthermore, infrastructure for electric cars and parcel stations within the residential areas are the measures considered to have future potential, whereas sharing mobility measures turned out to be insignificant for the residents.

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