



How might public transport become more extensively used by the local population in Nellmersbach?

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ABSTRACT: This elaboration deals with the expansion potential of public transport in the city of Nellmersbach. As a commuter city with an S-Bahn connection, the expansion of public transport is imperative for environmental reasons, since most of the traffic goes to the congested Stuttgart. Based on commuter flows and regional accessibility analysis, it is examined how long public transport to Stuttgart and the neighboring communities takes compared to the car. There is a quantitative cross-sectional survey

that shows the numbers before and after the 15-minute increase in the frequency of the S-Bahn and puts them in context. Based on qualitative extension proposals for taxi-on-demand, there should be an assessment of P&R users from Nellmersbach, who represent a critical group for the study and who could increase their use of public transport.

KEYWORDS: Public transport, rural, On-Demand, S-Bahn, frequency

1. INTRODUCTION

The mobility turnaround is an elementary building block for achieving the climate protection goals. Most recently, around 20 percent of German greenhouse gas emissions were generated in the transport sector (Petrowitsch/ Proibil 2021, 589). Especially in the state capital of Stuttgart, which in recent decades has always been one of the cities with the worst air pollution from car traffic, the shift from the car to the environmental network is becoming a climate policy task. In the past, the scientific focus of modal shift in the city was on changing infrastructural and behavior-changing push and pull approaches in the city center itself. The importance of suburban and rural mobility behavior for the city seems rather underrepresented in research: It can be assumed that the differences in mobility play a significant role in transport infrastructure and urban planning structures. In view of rising rents in the inner cities, a limited housing market and an ever-increasing volume of traffic on the one hand and a lack of academic, leisure and cultural offers in the countryside on the other hand, evaluations for setting the course for transport infrastructure are necessary (cf. Golant 2019).

In order to achieve modal shifting as such, it is considered necessary to differentiate between urban and rural areas when it comes to transport transitions. It is repeatedly pointed out that better connections outside of the city could help to attract more people from cars to public transport. While traffic behavior in the cities is increasingly multimodal, in the countryside the private car remains the number one mode of transport for the vast majority of the population (cf. Hochfeld et al. 2017, 36). It is used for most routes and even more so for other connections, which explicitly include rural-urban journeys. Incidentally, the dominance of the car also applies to holiday and leisure travel, which makes up a significant proportion of transport performance (cf. ib.). The change from conventional cars to more environmentally friendly alternative modes of transport represent a major challenge for public transport.

As a city in the Stuttgart region, in which an S-Bahn network has been under construction since 1978, a direct connection

to Stuttgart city center is at least as important as opening up all the districts of the neighboring communities and districts. The Stuttgart region and many municipalities have decided over the last decade to continuously expand public transport. According to the traffic sciences, there are several examples in which an increase in the frequency of services, as was the case with the S-Bahn, led to an increase in the usage of public transport. How the number of passengers developed at stops in smaller rural communities has hardly been researched to date. For example, there could be a "zero effect" and hypotheses could be put forward that after a certain frequency or a precarious public connection, a limit of transfer passengers will be reached, or there will be significant improvements for rural regions after a frequency increase.

The study will therefore deal specifically with the use of public transport in the Nellmersbach district of the municipality of Leutenbach in the Rems-Murr district with the question of the extent to which public transport use could be increased here. For this purpose, the mutual importance of the village as a suburban, rural region with the Stuttgart state capital is shown and the local mobility situation is discussed directly. However, in order to shift the denser rate of car use in rural areas to public transport in favor of everyone, the elaboration claims to show untapped potential with which public transport in this district can be made more attractive. For this purpose, the intermodal mobility solution taxi-on-demand is shown, for which there is also qualitatively demonstrable potential. Thus, at the end of the elaboration, there can be an open discussion on how to best increase public transport in Nellmersbach in the interests of sustainable mobilities.

2. NELLMERSBACH AND HIS ROLE IN THE PUBLIC TRANSPORT

2.1. General description of Nellmersbach

Maybe it sounds new at first glance, but the future air and traffic quality in Stuttgart depends on the mobility of the rural suburban villages like Nellmersbach: Most people live

in medium-sized towns and in the so-called suburbs of the metropolitan areas (Hochfeld et al. 2017, 36). The “little house in the countryside” enjoys unbroken popularity (cf. ib.). The workplaces, on the other hand, are mostly in the city or on the outskirts of the cities, which leads to pronounced urban-rural interdependencies and to a large number of commuters (ib.). In connection with more flexible working relationships and living conditions, this leads to lifestyles that are ever more distance-intensive and consequently to a sustained growth in traffic (cf. ib.). The more dispersed the settlement structure, the greater the daily radius of activities and thus the number of person kilometers that are covered (cf. Canzler 2016, 342). If one takes the future development towards urbanization seriously, in 2050 over 66% of the population could live in the city (cf. Ackermann 2022, 60). It must be questioned whether more growth is possible or desirable in Stuttgart, which is already well developed, in terms of transport and housing policy, which is why the bundling of opportunities in rural areas is a decisive precautionary factor from which everyone could ultimately benefit with less effort.

Nellmersbach is a district of the municipality of Leutenbach in Baden-Württemberg, which can be found about 20 km north-east of Stuttgart in the Rems-Murr district between the towns of Winnenden and Backnang. In absolute terms, the district has the largest number of commercial and industrial areas and is the most densely populated village of Leutenbach. While the population in other parts of the city is slowly falling, Nellmersbach has had a slight upward trend since 2010 with over 3,000 inhabitants. Compared with the rural area, the offer of public services is functional. There is no direct access to further educational institutions and the supermarkets, bakers and butchers have a monopoly. On the other hand, Nellmersbach has good air quality and living is significantly cheaper and usually quieter than in the state capital. However, the development of mobility in Nellmersbach is becoming increasingly one-sided. The data from the community of Leutenbach sees growing car availability. The number of cars per 1,000 inhabitants has risen by 22.5% from 515 to 631 since 1993 (cf. Statistisches Landesamt 2022). From a sustainability point of view, this should be viewed critically because driving a car, regardless of the drive, is primarily responsible for air pollution, in Stuttgart even up to 78% (Regierungspräsidium Stuttgart 2018, 23).

2.2. Train connection

Alternatives from the public transport with less pollution are existing: Since 1978, the S-Bahn has made it possible to commute directly to the city center from communities in the Stuttgart region. Historically, the original plan in Stuttgart was to replace the large Stuttgart tram network with a smaller metro network and car-friendly bus services (cf. Stuttgart city council 1961, 46). Since then, the S-Bahn was built to “primarily satisfy regional transport needs” (cf. ib.). Because the predicted population growth did not occur in Stuttgart’s core city but in the suburbs, it can be said that the transport capacities of the Stuttgart S-Bahn network were undersized from the start (cf. Niederich 2018, 99). The region of Stuttgart has repeatedly decided in recent decades to increase the frequency of the S-Bahn. Based on the rigid 20-minute cycle of the earlier suburban traffic, each S-Bahn line was originally operated in 60/40/20-minute cycles. Every 60 minutes in the evenings, weekends and in the early morning hours, every 40 minutes during the day and every 20 minutes during peak hours (cf. Vallée 2003, 655ff). On certain branches even every 10 minutes (ib.). From 1985, the S-Bahn ran every 30 instead of 40 minutes during the day. The 60/30/15-minute cycle came in 1996, which also worsened the 10-minute cycle on selected S-Bahn routes. By the timetable change in December 2020, the gap between the

earlier morning and afternoon rush hours, which still existed between 10:30 a.m. and 12 p.m., was finally closed. Consequently, there is a 15-minute service everywhere during the day, every half hour late in the evening and a 60-minute service in the night on selected S-Bahn lines with a single 120-minute gap.

Nellmersbach was not integrated into the S-Bahn system until the winter timetable change in 1981, when the S-Bahn line 3 was extended to Backnang. There is evidence that the Rems-Murr-Kreis was even envious at this time, since two S-Bahn lines were planned here with the S2 and S3, so that former district administrators saw themselves as “privileged”. Immediately after the start of operations, the S-Bahn became a victim of its own success: the S3 from Backnang to Stuttgart, which ran through Nellmersbach, was extremely overcrowded in the morning rush hour: 1000 passengers in the trains that were only intended for 800. According to the Bundesbahn, the reason for the “short vehicle cover” was that they had not expected such a rush (cf. Winterling 2013). Today, the S-Bahn line between Backnang and Stuttgart Airport runs like all other S-Bahn trains in Stuttgart. The next southern stop should not be underestimated, Winnenden. It is the next crossing station from Nellmersbach, which can be reached in two minutes. The three-lane train station is also used by faster regional trains, such as the MEX 19 to Schwäbisch Hall and Crailsheim or the RE 90 to Nuremberg every 120 minutes. All of them start and end in the terminal station of Stuttgart with fewer stops. Those are provided by the state of Baden-Württemberg directly compared to the S-Bahn, which is organized by the region of Stuttgart. The height of the passengers from Nellmersbach by S-Bahn could be shown with a database of the cross-sectional analysis, which the researchers are going to present in the chapter of the research methods.

2.3. Bus connection

Also, Nellmersbach has the public bus 335 next to the S-Bahn. It runs every hour between Monday and Friday 6:00 and 20:00 from the Nellmersbach industrial park via Winnenden to the Rems-Murr-hospital in Winnenden. Due to public services, the final stop is relevant, as it is the closest hospital for the local population. When there is school, the bus drives more often in the morning. After nine minutes of travel time, it stops at the Winnenden ZOB, where you can find a direct connection to the regional trains. In addition, this station is unmistakably a municipal traffic hub for public transport throughout Winnenden. Every Winnenden community is directly connected per bus, but usually only at an hourly rate. There are also direct bus connections from there to every part of Leutenbach. However, it is characteristic that this marginal offer of public transport does not serve many places in the immediate vicinity directly. The direct neighboring municipalities of Weiler zum Stein and Hertmannsweiler are not served by a bus connection over Nellmersbach, and certainly also not the municipality of Erbstetten, which is directly connected to the north via the K1846 and is already on the S4. Not even from larger places like Winnenden, a regular bus line was set up here. The fact that public transport from Erbstetten to Nellmersbach would take just as long as from Stuttgart to Mannheim indicates a structural deficit in public transport in rural areas, which of course also goes hand in hand with the question of how high the demand for such a route can be. Although there are no reliable cross-sectional surveys, it should be anticipated that the researcher got additional data from an interview that the bus service in Nellmersbach is only used functionally to school, to work or as a direct bus to Wunnebad, which is the biggest swimming pool in Winnenden and that the bus usually does not show high number of passengers.

2.4. P&R option

Because road congestion is a common occurrence in cities with high traffic volumes, the ability to expand the street network is frequently hampered by dense construction and other terrain limits. Due to these circumstances, strategies to reduce the number of cars entering the city center are put into practice. There is a propensity to construct park and ride (P&R) as a docking-solution with parking lots on the fringes of various cities all over the world. They are made to allow users to combine travel on their personal vehicles with travel on public transportation, which helps cut down on the number of automobiles. P&R should make the city centers more accessible by public transportation easily. Additionally, civilizations that aspire to live in a clean atmosphere are becoming more and more ecologically conscious. P&R should also be able to reduce the time for searching parking spaces. Karamychev and van Reeve (2011) show that as a result of low speed and less fuel consumption in packed areas, travel costs can be decreased (Karamychev/ van Reeve 2011, 459). Also drivers can leave their vehicles in P&R, which sometimes includes a ticket for public transportation. On the other hand, a key consideration is where to put P&R and how to organize high-quality public transportation. Experience has shown that P&R parking should be situated outside of cities close to public transportation stops, while public transportation should be modified to satisfy user needs for travel convenience, frequency, and dependability of service (cf. ib.). Because P&R can distribute more traffic, individuals may drive short distances to the P&R parking before switching to public transportation, so also Nellmersbach tries this docking station. The primary objectives behind it are increasing mobility in cities, promoting the use of public transportation, reducing traffic congestion and pollution (Karamychev/ van Reeve 2011, 455f). The benefits of the P&R docking option are obviously multiregional: A successful P&R program can support changing town centers, such as pedestrianization. Those parking spaces on the outskirts can boost the overall supply while freeing up central land for more socially advantageous uses. To look directly at Nellmersbach, P&R is generally well-received by motorists. Arriving at the P&R in Nellmersbach means that you have priority access to the S-Bahn without barriers or other restrictions. When you speak about the P&R policy, it seems to be a redistribution tactic in the push-and-pull approach, which is used for the mobility turnaround. For pushing car traffic out of the city centers, the P&R pull car traffic from the rural areas, like an attractive pricing system, enough parking space, direct accessibility to the S-Bahn. The better a S-Bahn system is, the sooner the usage for P&R will improve. The number of commuters from Leutenbach are therefore a key indicator that people generally commute out of Nellmersbach. The pendulum balance per 1,000 inhabitants is -524. The greater a city's pendulum balance, the greater the likelihood that people will migrate from these areas in the future. Veller (2016) pointed out that commuters make up 60.4 percent of all employees at the Stuttgart workplace. Almost 70 percent of commuters come from the five districts in the Stuttgart region, almost 20 percent from the rest of Baden-Württemberg and just over 10 percent commute to Stuttgart from Germany or abroad. The growth from the Rems-Murr district, in which Nellmersbach is also located, amounts to 11.1%. (cf. Veller 2016, 267)

2.5. Proposed expansion options in public transport

When it comes to "expansion", many will first think of adaptive transport planning that aims only to meet transport needs. The term suggests a purely technical and infrastructural expansion, but this does not correspond to the whole. Local public transport is already thought of as being intermodally networked with various means of transport, in con-

trast to "automobilism", which is described as monomobility (cf. Burkart 1994, 222). The flexible use of high-quality mobility services is becoming increasingly important (cf. Meyer/Shaheen 2017). A preparation of which offers can be used flexibly and sensibly should make the mobility turnaround attractive. Whether the positive slogan of intermodal traffic: "More mobility, less traffic, good for the environment" can really be implemented is a key question of sustainable mobility (cf. Maertins 2006, 2).

In this study, only the concepts are presented below which, in the opinion of the research group, make mobility sustainable. That is, "if it consumes resources in such a way that everyone can be just as mobile everywhere and across generations" (Kesseling 2022, 5). In the past, it was discussed, among other things, that the connections with the bus from Nellmersbach to neighboring communities are unsatisfactory. It would be obvious to include a variant of the bus extension in the potentials. However, it is becoming increasingly clear that from an economic point of view regular buses in rural regions can no longer be used efficiently (cf. Brenck/ Gipp/ Nienaber 2016, 24). Although a special level of subsidies is given in Baden-Württemberg, less strong revenue situations compared to the costs usually lead to the transport services being reduced to the required minimum. Due to the lack of data on bus occupancy, a review of a regular bus expansion in the research work cannot be managed and will not be pursued further due to the low probability of implementation.

2.6. Taxi on demand

In order to expand local transport step by step in rural areas, intermodal solutions can occur that work significantly on the transport system and could significantly improve public transport holistically, i.e. both municipally and regionally. Instead of buses, **taxi on demand** as a docking solution came into the discussion: In the 1970s, there were still call-bus or shared taxis, which are similar names (cf. König/ Gripshoven 2019, 10). If these needs-disrupted offers were originally restricted in their performance by booking trips by telephone using simple calculation rules, the disposition system enables digitization to create new degrees of freedom and more demand-oriented options. On the one hand, a higher efficiency of the fleet is now possible and there is also a basis for improved individualization of traffic. The flexibilization of mobility offered by advances in information technology represents a logical continuation of the growing desire for individual mobility in the 21st century.

Regular bus connections are only offered every hour, such as in Nellmersbach, public transport is perceived as inflexible. To close this gap, various providers are trying to offer passengers innovative door-to-door mobility solutions by using intelligent algorithms. Digital and on-demand mobility services differ significantly in their flexibility and dynamics from old call buses and shared taxis. The use of intelligent routing algorithms, the provision of real-time information and a flexible digital booking option was not possible with a pure telephone booking. Today's technical possibilities with taxi-on-demand combine the advantages of a call taxi and a community bus: You can get people from point to point within a certain radius by locating with an accuracy of 5 m. Although stops are obsolete in the system via digitized booking offers, there is the possibility of putting up signs to equip them with an order button in order to book the next taxi manually. The combination of traditional and digital booking should bring the greatest potential for use (cf. König/ Gripshoven 2019, 11f).

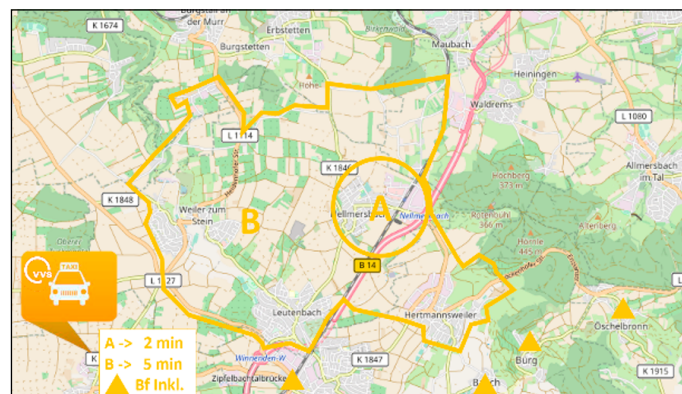
In order to find out the attitudes of the population towards taxi-on-demand for the research work, a vivid example had to be worked out for Nellmersbach. The functioning of such a system as a new add-on for the public transportation of

Nellmersbach could look like this: in principle, the on-demand-service should be fully integrated into the VVS offer directly. This means that neither additional app nor ticketing is required, but that you can book a journey directly with the VVS app. In contrast to ride pooling, however, this on-demand service would be carried out by selected VVS employees. The seriousness that a transport company will radiate is still rated higher than being picked up by strangers by car at different rates. The feeling of security, security and togetherness is necessary in this context in order to create an attractive offer. It will no longer matter where in Nellmersbach or within a 3 km radius of this residential area this request is sent from. It will always be possible to go everywhere in the named radius from that point. Individual bus stops in neighboring communities are also integrated in order to be able to use this new mobility offer here, at least in a bundled form. It is of great strategic importance for public transport that the Nellmersbach and Winnenden train stations are connected to the system, which guarantees door-to-door at two rail transport hubs, which is part of a smart city concept (cf. Ackermann 2022, 65).

Since the train stations can be reached directly and with less effort, the general use of car traffic in the direction of Stuttgart will be reduced. The entire local potential is to be accessed with taxi-on-demand. With the recognizable taxis, a mobility guarantee is to be created on site, for example to enable daily shopping in the large supermarket, the play in the next neighboring community or the next sports field and from there back home regularly without a car. For the local population and their neighbors from Hertmannsweiler, this can replace pick-up and delivery services, in which regular standing orders can be booked. It is technically possible to combine both spontaneous bookings and standing bookings. The guideline waiting time for a spontaneous taxi booking in Nellmersbach at daytime is two minutes, in other villages in Leutenbach and Hertmannsweiler five minutes. The tendency of taxis should be the train station of Nellmersbach. Stops outside this mile have to expect a longer waiting time if they book spontaneously, on the other hand, standing orders can be planned down to the minute. There are also statistics on how many cars could be replaced with such a consistent taxi-on-demand concept. If the vehicles were even able to drive autonomously in the future, it is predicted that a single taxi ride could replace 7 cars, with a pooled shared autonomous vehicle (PSAV) even 17 per vehicle (cf. Ackermann 2022, 194). Since combined routing options are already available today, such shifting numbers can also be compared to a human driver. With such a flexible offer that these taxis drive around the clock and mainly wait door-to-door at the train station, public transport will experience a real mobility policy upgrade as an interconnected solution.

From a climate policy point of view, however, there are also concerns: Despite smaller, lower-emission vehicles than in scheduled services, there is of course also an increased potential for pedestrians and cyclists to be shifted to the on-demand service, which generates more emissions. With such a good quality of offer, traffic is also induced, so probably more traffic locally will be created and thus also more emissions (cf. Esser/Kurte 2018, 32). Only when you look at the overall comparison, it is possible that fewer people would use their own car to commute, but intermodal with the taxi and train with the same ticketing. The more trips that are planned in advance, the more trips could be combined, and the fewer vehicles such a system would use when taking several people to the same place at the same time. Of course, the hassle increases when more people use it, but since the population of Leutenbach is manageable, taxi drivers will only have to concentrate on driving, stopping, and letting their passengers in. The integrated provision of the offer in the public transport network sets the ambitious goal of creating a mobility offer around

the clock in Nellmersbach. It should be examined further how traffic behavior in rural areas will change as a result of such close-meshed systems. Even with a generous dimensioning of vehicles, it is always acceptable that a change in mobility behavior takes some time to be accepted by the masses. This would be beneficial for the quality of operations, but not for a quick profit margin for transport companies.



outside of the capital area, may not be sufficient for passengers who absolutely want to switch to Stuttgart terminal station. Because of the construction work on Stuttgart 21, the S-Bahn station and the terminal station that has been moved forward are a 15-minute walk away from each other, which is unattractive. In principle, it is an increase in travel time that paralyzes public transport, so especially for those, who are switching at the terminal station, the demand of the MEX from Winnenden ending above will stay on a high level until the Stuttgart station is linked better again. A big question is whether it is possible to create offers in Nellmersbach within a 15-minute S-Bahn cycle. For example, if you have a 10-minute cycle on the S-Bahn in Berlin, you create significantly more capacity in general up to 20% compared to the 15-minute cycle (cf. VBB Verkehrsverbund Berlin-Brandenburg 2020, 41). Wurmthaler (2019) warns of the quality of the S-Bahn and thus rejects the 10-minute service. Since all S-Bahn lines in Stuttgart are routed through the main route, there is no additional capacity for a 10-minute cycle in the current S-Bahn system (cf. Wurmthaler 2019, 2).

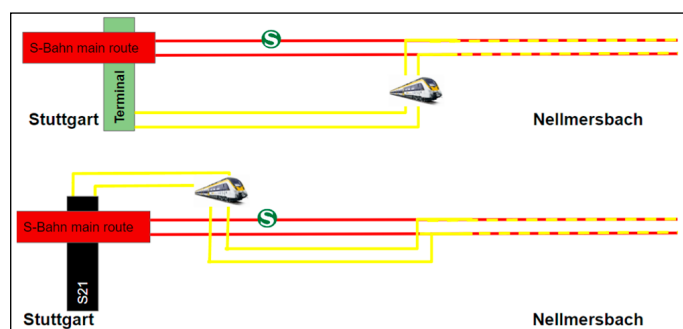


Fig. 2: S-Bahn and MEX routes between Stuttgart and Nellmersbach today vs. with Stuttgart 21

The two options above do not accommodate possible additional capacities. The capacities for the Stuttgart 21 (S21) underground stop are planned at the limit (cf. Schwanhäuber 1997, 58). Compared to the S21 stop, the Ministry of Transport gave the terminal station clear advantages in terms of its expandability and capacity increases, but their necessary access routes have been dismantled as part of the S21 work (cf. Ministry of Transport Baden-Württemberg 2013, 14). For this reason, the establishment of further trains in these areas would not be given. But are there other options that deviate from the system? More realistic for the future would be a special S-Bahn or MEX that does not stop at all stations. Even if it could only be implemented on a two-lane route at short intervals, there would be the possibility that a special S-Bahn would be installed, which would hold on at the S3 stops between Backnang and Waiblingen, but from then on it would not stop on the four-track section to Bad Cannstatt and from there on today's railway bridge at ground level to the Stuttgart terminal station. In the future, all other trains would end in the new tunnel route there, so that they could drive into the underground stop after the completion of Stuttgart 21. Between Backnang and Waiblingen, the frequency would be also shortened when those fast S-Bahn trains runs before the current S-Bahn line, like every 30 minutes so sometimes the frequency can be reduced on the S-Bahn from 15 to 7 minutes.

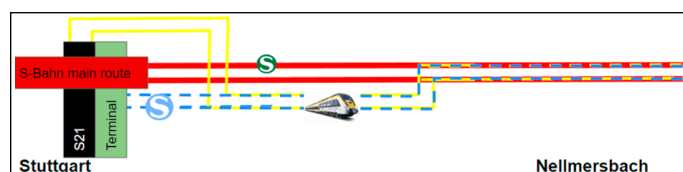


Fig. 3: S-Bahn and MEX routes between Stuttgart and Nellmersbach with combi station

Only necessary for this would be the preservation of the Stuttgart terminal station and its direct connection to Bad Cannstatt. Then such faster S-Bahn trains could be used to increase the number of passengers from rural areas and help for an intelligent distribution from the typical S-Bahn trains. Depending on how big the commitment to maintain the terminal station would be politically, better frequencies could also take place on other S-Bahn routes - a rigorous preservation of the terminal station would mean 27 tracks, so Stuttgart would have the largest train station in Germany and thus serious station capacity for the mobility turnaround.

3. RESEARCH METHODS

3.1. The development of the research

In transport science, it is common for a spatial planning analysis to collect commuting statistics in advance in order to determine how many people generally commute in and out, regardless of their mode of transport (cf. Canzler 2016). Subsequently, accessibility studies should show the current status of how long it takes to travel from the points under consideration to the neighboring communities and to the nearest large city. Only then will the more specific case of the S-Bahn be discussed: The development of the topic of public transport in Nellmersbach, the BMW Research Institute for Mobility Research (2006) and other secondary literature had repeatedly shown that more frequent offers bind more passengers to local transport (cf. Institute for Mobility Research 2006, 136f).

Under this hypothesis, it should be shown in Nellmersbach outside the core city of Stuttgart how much the compression of the 15-minute interval in Stuttgart between 2011 and 2018 led to an increase in passengers at the Nellmersbach stop. A quantitative cross-sectional survey of the S-Bahn station is therefore available. Following the cross-sectional survey, there will be a qualitative discussion of how the local population in Nellmersbach uses the offers of the environmental association. In order to evaluate possible expansion potential, more in-depth qualitative social research is required, which also considers the S-Bahn not only one-sidedly. Since the automobile in rural areas, in contrast to many cities, definitely does not yet have an obsolete status, potential is seen in park and ride as well as in an environmental network integrated taxi-on-demand system. For this purpose, people will be interviewed at the official Park and Ride station directly at the train station in order to analyze the mobility situation in Nellmersbach. Integrated into this are, apart from demographic queries, the individually used options of public transport, which integrate S-Bahn, bus, Park and Ride and the Taxi On Demand option.

Finally, it should be found out which bundle of measures is preferred. An overview of how this could function in terms of capacity and infrastructure and how it is widely accepted by the population should also answer the research question. With this orientation, however, the research work differs from a more in-depth examination of a concrete push-and-pull policy: Neither a change in pricing policy is considered in the study, nor restrictive measures to reduce car traffic such as lane narrowing on federal highways or speed reductions. The elaboration is limited exclusively to the public transport orientation, since after examining the following commuter statistics, the use of active mobility in the entire transport choice system is assessed as too low. With the help of holistic mobility studies, position determinations can be carried out more specifically than in a "one-sided" pull consideration of public transport.

Summarized, there are a total of four methods that are used as standard:

- **Commuting statistics:** They are carried out to identify necessary traffic flows
- **Regional accessibility analysis:** For covering the connections to the neighborhood and to the nearest major city. Travel times, often determine traffic behavior.
- **Cross-sectional survey** of the S-Bahn station: It was to be used to check how many passengers travel by train and what effects a reduction in services would have on the community. These were requested from the Stuttgart region.
- **Qualitative interviews:** In order to qualitatively record shift potential, P&R users in Nellmersbach were asked about their mobility behavior in this study. In-depth surveys about a potential mobility-on-demand offer are integrated here. The regional accessibility analyzes cover the connections to the neighborhood and to the nearest major city. Furthermore, it is necessary to consider travel times, which can often determine traffic behavior. The regional accessibility analyzes cover the connections to the neighborhood and to the nearest major city. In order to qualitatively record shift potential, P&R users in Nellmersbach were asked about their mobility behavior in this study. In-depth surveys about a potential mobility-on-demand offer are integrated here.
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3.2. Quantitative Analysis

For the study, there were several forms of quantitative research: There are a commuting statistic to see how many people commute, regional travel time analysis to see how much time the difference between public transport and private cars is today and cross-sectional analysis from the commuters of the S3 in Nellmersbach before and after the expansion of the 15-min frequency to show a possible difference. The researcher asked the Region Stuttgart, which is responsible for the S-Bahn system in Stuttgart for the cross-sectional analysis of the S3 commuters in Nellmersbach for 2011 and 2018 by mail and by phone. In the mail, the researcher got back, there are two tables with the same data. One is the absolute number of passengers for the years 2011 to 2021 from Nellmersbach in total, the other visualizes it daily.

3.2.1. Commuting statistics

The number of commutes makes it clear that there are many connections between the regions, which can be seen in terms of traffic. However, it also shows a risk that increasing car use in rural areas can negatively affect the air and mobility situation in Stuttgart. In absolute numbers, in 2020, Leutenbach had one of the most negative commuter balances with a total of -3,458 commuters after Weinstadt (-3,902). The lower the value, the more people work elsewhere. A closer look at the 2,087 commuters shows that the cities of Winnenden, Backnang, Waiblingen and Stuttgart account for around half of all commuters to Leutenbach. Leutenbach covers a third of its commuters from the neighboring cities of Winnenden and Backnang, which shows the regional importance of such a municipal interdependence. At least 1,060 remain in the local area, which corresponds to 9% of Leu-

tenbach. However, the commuter destination of the people from Leutenbach made clear where most of the people from that commune were drawn to: the state capital of Stuttgart. 1,318 out of 5,043 commuters in total commute there, which is with 26.1 % the highest value in Fig. 4.

And although the emigration figures are clear, it is intended to make the rural region future-proof. The constitutional task of creating "equal living conditions" is mentioned again and again. And although spatial planning has few resources for change processes, there are progressive approaches to upgrading the country. Thus, analogous to the "right to the city", the "right to the village" repeatedly comes up as a demand that includes the fact that rural regions can also develop both in local transport and in terms of labor market policy (cf. Belina et al. 2021, 407f). These places, which are home for many, should be kept or made attractive so that every generation has a good perspective on life (cf. ib.). This increases the value of being rooted in one's home country and gives the population an equal option of being able to stay with new professional and educational opportunities. This would also break with the trend of multi-local decomposition of living habits, which leads to housing and job shortages in the cities (cf. Rüger et al., 135). Such an individualization is "accordingly - just like mobility - by no means proof of successful freedom, but rather a shifting of constraints and a damnation of having to find one's own in the chaos of change" (cf. Hoanzl 2017, 48). An improvement in the structural situation in rural areas also contributes to relieving the city, mobility solutions play a significant role in this. The interdependence of the municipalities of Nellmersbach and Stuttgart can therefore also be regarded as interdependent.

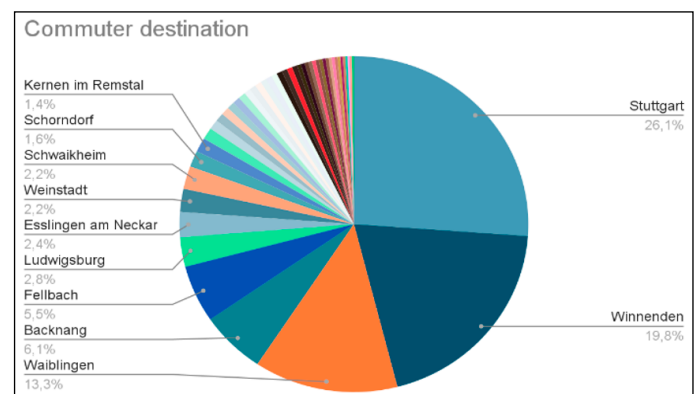


Fig. 4: Commuter destination from Leutenbach

3.2.2. Regional travel time analysis

Travel time still remains one of the most important criteria when making mobility decisions. If more activities are to be undertaken in ever tighter clocked daily routines, individual activities become less important, which means that the willingness to invest time in traffic also decreases continuously. The idea of individualization, which is widespread in the transatlantic region, creates a need to keep travel times as short as possible (cf. Wondratschek 2021, 16f). The fact that travel distances are getting longer is favored by an ever-increasing urban-rural divide. It can be seen as a blocking instrument for sustainable mobility when high rent or housing costs in the city inspire a gentrified expansion of the city called "urban sprawl", which Schmitz (2020) describes as "space-eating" and "faceless" (cf. Schmitz 2020, 8). The approach to a regionalization of life and economy can be a strategy to reduce traffic with short distances (cf. ib.) This is exactly the way of thinking for "a right to the villages". By comparing local destinations with those from the capital, you might see differences in the achievement times, so anyone can better understand the reasons for an existing favored mode of transport. Over 59.2%

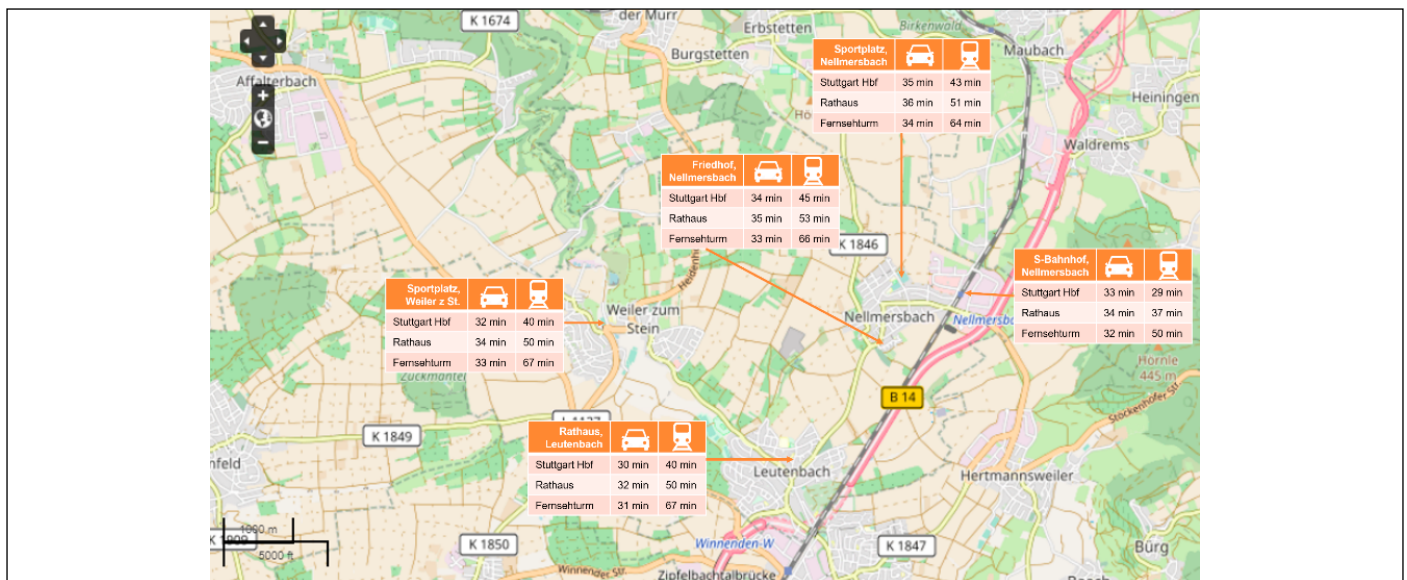


Fig. 5: Travel time in the Stuttgart's destination

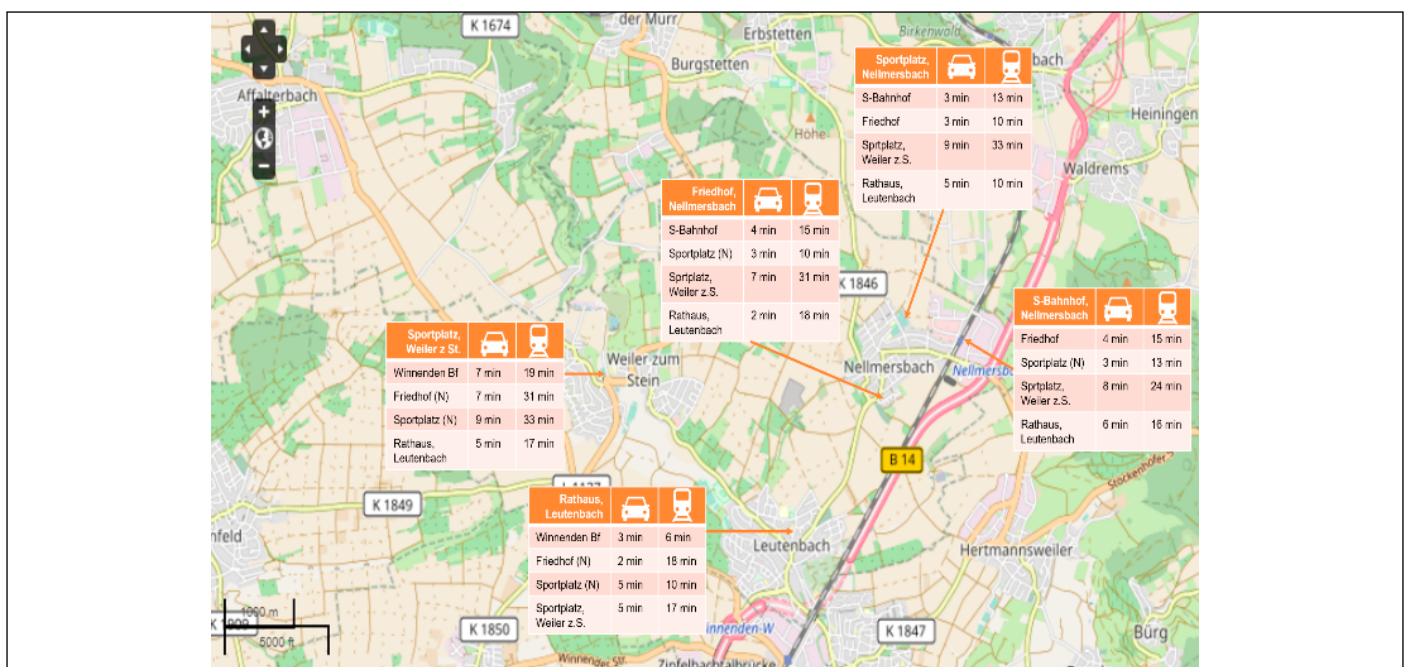


Fig. 6: Travel time in the Nellmersbach neighborhood

of the people from Nellmersbach commute every day in the region, so a comparison of the travel time for cars and the environmental network between local and regional routes is necessary. The direct relations to the state capital, to which 26,1% are commuting, were calculated from five selected way-points located in the municipality of Leutenbach.

Various points can be selected as fixed points of a city. The selection is based on choosing a transport hub and two destinations, one in the city center and one in the outskirts. The main station, the town hall and the television tower were therefore selected for Stuttgart. Although the commuter data does not indicate the exact location where commuting takes place, such a mix offers a more balanced picture of the times to be assumed. The commuting time with the environmental network (EN) to reach a destination in the capital often takes more time than using a car. Only between the Nellmersbach S-Bahn station and Stuttgart Hbf the public transport is faster.

Here you can also see a Stuttgart-specific phenomenon: The public journey time to the television tower is so long be-

cause only the slower U-Bahn goes up. From the town hall of Leutenbach it is particularly drastic: Instead of 31 minutes by car, it would take 67 minutes by public transport. So it would be too short-sighted to make the state solely responsible for weak public connections, since Stuttgart's public transport system can also be expanded.

However, if you look at the travel time to the neighborhood villages of Nellmersbach, it is noticeable that the significantly different travel times already occur in the municipality. Of course, bicycles would have a mitigating effect on sections of the route, but the immediate availability of a bike is not always certain. But if the bus is missed, many people usually walk. It can therefore be said that the street is superior to the public with such travel times. But even if the alternatives to the road in rural areas are few or simply non-existent, it is necessary to present more mobility policy concepts for the road than to suggest the need to own a car with P&R. It's about how the potential could look to make public transport as attractive as possible for the local population.

3.2.3. Cross-sectoral analysis

To find out how many people are using the S-Bahn, there is a need for quantitative data. In transport companies of Baden-Württemberg, they use "cross-sectoral analysis", which are based on quantitative passenger surveys, organized by the train providers. Often the data is not available for the public because they are heavily subject to corporate secrecy. In public, the absolute number of passengers is often presented, which often increases. For Nellmersbach, the research group needs the data from the special train station. There are no alternative digital options, such as exact counts using modern evaluations of camera data, and they would not be feasible in Europe in terms of data protection anyway. It would have been conceivable to simply carry out the survey independently. However, the time-benefit ratio and the lack of reliability in the projections from a few points in time speak against it, and the research group sees no reason to distrust the author's data collection. The implementation is carried out by a commissioned institute, which uses traffic counters several times a month on different days and for all trains. Statistics can be created at the end of each year, and the operator can even have more precise surveys of the individual trains. However, if you look at the results of the cross-sectional analysis, you can see that after a consistent introduction of the 15-minute frequency during the day, there were no significant changes in mobility behavior at Nellmersbach. The maximum number of passengers in Nellmersbach was reached in 2014. During Corona, the passenger went back clearly. Before that, however, you can see a stagnation in passenger numbers at this stop. It seems that the introduction of the 15-minute clock didn't have much of an effect. A marginal increase between 2011 and 2018 cannot significantly confirm that the frequency of the S-Bahn needs to be improved.

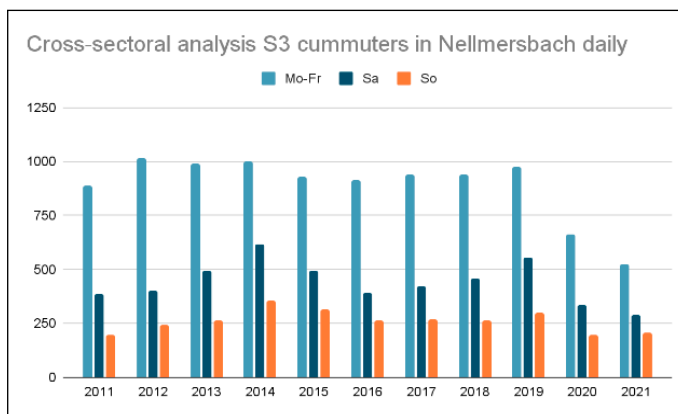


Fig. 7: Cross-sectoral analysis S3 commuters

5.3. Qualitative Analysis

As qualitative method the researcher group made face to face interviews about the opinions from the people to evaluate their shifting potential. To check the current situation of their usage of the park and ride system in Nellmersbach and to know the real conditions the interviewees counted the number of illegally and legally parked cars at the day of the interviews.

5.3.1. Instruments

For the different interviews a guideline was outlined. People, who are interviewed, were find spontaneously, the answers were immediately recorded in writing. The researchers checked following attributes in 4 to 5 minutes with 42 persons.

- Place of residence
("Could you tell us, where is the place of your residence?")
- Destination
("Where is your destination for today?")

- Frequency of usage of park and ride
("How often do you use P&R in Nellmersbach?")
- Opinion to the S-Bahn frequency
("Can you tell us your opinion about the current S-Bahn frequency in Nellmersbach and is there something you want to enhance?")
- ticket of public transport and mobility behavior with On-Demand option.
("Which ticket for public transport do you use? Also, we want to share the idea, that Nellmersbach and his neighborhood could get a taxi-on demand service, where you can book taxis online by app, by button on some POI in Nellmersbach or by phone. The ticket would be integrated in the VVS system, so you can commute free, if you have a VVS subscription. In Nellmersbach you'd only wait two minutes, in other villages 5 minutes. Would you use such a service in future?")

5.3.2. Choice of people and location

The persons were randomly selected at the park and ride car park. The research group did not commit to an age group but addressed everyone who was staying at the park and ride in Nellmersbach for the study. There are several reasons why park and ride users were chosen for that interview. Basically, it was about being able to ask a maximum number of people in Nellmersbach about public transport in a short period of time. In the period between the end of May and the end of June 2022, no better opportunity was seen to have many conversations, e.g., at village festivals, football match days or other regionally important events. An alternative idea of recording interviews at the local supermarket was rejected because the surveys had to take place on days when the frequented supermarket was closed and because on the common observation day there was only one football team in the parking lot, whose attendance was not certainly valid for a scientific interview at that moment.

But not only the reason that a lot is going on at the park and ride was crucial: Anable (2005) conducted a psychological item test to investigate the potential for change in modal choice behavior (Anable 2005, 71).

The result is six target groups with "malcontented motorists", "complacent car addicts", "die hard drivers", "aspiring environmentalists", "car-less crusades", "reluctant riders" (cf. ib.). The solution consists of four groups with car ownership and two groups without their own car. Recommendations for action are suggested for each group. The people who use park and ride are therefore a main target group, since they drive a car but are also "willing to change" because they use park and ride. Here, the groups "malcontented motorists", "complacent car addicts" and "aspiring environmentalists" can be found, which make over 74% of all in general (ib.). The target group "die hard drivers", "car-less crusades" or "reluctant riders" can be neglected, since their mobility behavior will not change with improvements in public transport, since they never or already use it constantly. By asking which ticket someone uses, mobility behavior in public transport can tend to be determined in order to be able to make classifications.

5.3.3. Implementation

The qualitative study took place on 15, 18, 19 and 23 June 2022 on very hot days over 30°C in Nellmersbach. Before starting the interviews, the group familiarized themselves with the overall capacity and implementation of the park rules. The time slot was from 13:00 to 16:00, on the last date from 12:00 to 19:00. It was possible to interview more people in a shorter time. This is exactly what the guide should be designed for. While the short statements about park-and-ride,

S-Bahn frequency and tickets often ran without complications, briefly explaining the taxi-on-demand idea was challenging. The research group wanted to present the vision in four short sentences. Only one or two respondents gave the impression that they might have misunderstood something. It was a challenge to make the speech as simple as possible, which is why the sentences only had to be established after the fourth and fifth interview. Basically, the German-speaking researcher encountered open, friendly attitudes from people who were all willing to take part in the study. No changes were made, in one single exceptional case a study participant was spontaneously asked directly from Nellmersbach about the local bus service.

5.3.4. Description of the Sample

Before talking about the core content of the results, it must be said that there was a surprise when it came to the age and gender of the respondents: Of the 42 respondents, only 6 were women. The interviews are therefore mainly based on the opinions of men. This gap is more extreme for residents of Nellmersbach: 15 men and only one woman. There is also an interesting demographic outcome: over 75% of all participants were no more than 40 years old, only 25% older. This means that “young men” in particular dominate the following results

5.3.5. Results

Park and Ride Counting

It must be made clear that the P&R in Nellmersbach is not integrated into the public transport system of the VVS (transport association of Stuttgart), and that tickets only have to be bought separately, which according to Parkhurst (1995) is “disadvantageous” (cf. Parkhurst 1995, 19). On the other hand, there are partially covered bicycle parking spaces and small approaches to increase micro mobility. On 15 June 2022, the researcher noticed during their observation critically the situation of the P&R in Nellmersbach. From 94 cars only 51 have parked in the P&R area with valid parking tickets, but 43 parked illegally. With a day ticket for one euro and monthly tickets for ten euros, such numerous violations are surprising. When it comes to increasing public transport, however, it is always questionable how successful P&R is really in practice. The usage of space stays limited with the parking areas despite its size and in terms of statics and transport infrastructure it is a revelation that the local public transport and the public access to the train station as a transport hub are insufficient. To see P&R as a sustainable long-term solution is a big misunderstanding, because not everyone wants to drive a car. If Nellmersbach really is depending on the road or how fast you can get with the environmental association from this village should be shown in the next section.

Place of Residence

When it comes to residence, there is a clear picture: Only one person came safely from outside the Rems-Murr district, from Jena, three gave no information. The rest come from the region of Stuttgart, 39% directly from Nellmersbach.

Destination

There was a very strong bias as to where people commute to. Double entries were possible, so that Stuttgart was the destination in 32 cases. Other destinations within the region were named 9 times, 2 more in Baden-Württemberg, 1 was Munich (German-wide). If you look at the commuter statistics, it is noticeable that a disproportionately high number of people commute to Stuttgart: At least 78% of the P&R users had the state capital as their destination in the study, while only 26.4% had the destination in the commuting statistics. For inhabitants, there were even 81% whose destination was

Stuttgart. In this respect, it can be said with high probability that commuters with public transportation from Nellmersbach to Stuttgart use P&R.

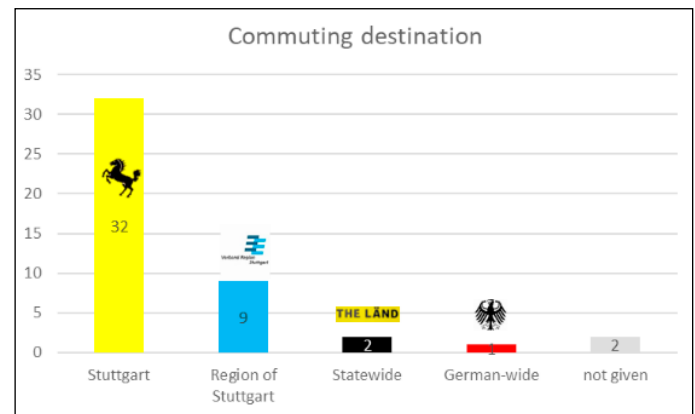


Fig. 8: Commuting destination

Frequency of usage of Park and Ride

The result of the frequent P&R usage is that this docking station has so far not been used as a “regular parking lot” but as a “P&R with a high degree of usage variation”: 33% have used it for the first three times, a quarter often, and another quarter usually to events such as parties, VfB matches or visits to Wilhelma. It is striking that Nellmersbach was more self-critical about the use: The quotes “don’t like parking here”, “often walk to the station, but today it was too hot” or “no one can bring me to the S-Bahn with luggage” that users take a critical look at P&R and it sometimes seems apologetic. Other people from Nellmersbach give pragmatic reasons, such as “too foul to walk”, “hates car-driving” or “can drive home at night directly”.

Opinion to the S-Bahn frequency

After that, the participants showed their opinion on the S-Bahn frequency. 11 users were satisfied with the S-Bahn frequency, but the majority clearly wanted a continuous 15-minute frequency the whole day, i.e., at least until night, but also on weekends. Even more radical are 11 users who demand a higher frequency and name Berlin as a role model. 3 would like to have fewer stops to speed up the S-Bahn, 7 gave a general criticism of how bad public transport is still in their region compared to the situation in Nellmersbach. When it comes to the S-Bahn, the local population of Nellmersbach is much more critical. Clear overall improvements in public transport were proposed for 15 out of 16 study participants. While 9 here would like to have the 15-minute cycle all day, there is also a blanket criticism of the bus services or 5 want a higher frequency.

Ticket of public transport and mobility behavior with On-Demand option

Do critical Nellmersbachers also mean worse VVS subscription usage in P&R? According to this study, this question should be answered with a clear “no”. 6 out of 9 VVS subscriptions belonged to a person from Nellmersbach. The subscription usage rate is therefore disproportionately high compared to the others, but single tickets for public transport are rarely bought from the P&R users from Nellmersbach. This can clearly also have something to do with the fact that during this period the 9€ ticket brought people back onto the trains for the first time since Corona. It is precisely that Nellmersbach’s population proposed technical innovations. Additionally, better bus services to Winnenden are required or a third track to Backnang.

However, taxi-on-demand is hyped by the focus group: Over 90% state that they’d use the offer, but 100% of the

local population of Nellmersbach. But it is also about the design of this project. For example, the demand is for it to be as simple as possible, for the taxi call to be implemented using a button, or for older people to have taxis on demand because young people can walk. Some interviewees revisit the fact that the project will improve the mobility situation. One of them stated that it would have “no impact” on the climate, but that everyone would buy a subscription. Another interviewee spoke of the “capacities question”. On the other hand, most of the given comments are clearly supportive, like they were talking about “the solution”, “fantastic idea”, “cool idea”, “for the suburbans the best solution”, “huge chance” or “more than the lazy bus”.

4. DISCUSSION

One of the most explosive outcomes of the study presented is that the extension of the 15-minute interval on the S3 from 2011 to 2018 has not led to growing passenger numbers in Nellmersbach. In Nellmersbach, only minimal increases can be seen in the comparison period before the start of the pandemic. For this reason, it is acceptable that **a higher frequency of trains alone will not motivate more people to switch to public transport**, even if a lot of P&R users directly from Nellmersbach were in favor of more frequent services on the rails. Rather, it must first be seen how people can be persuaded to use public transport.

Accepting P&R offers is limited, but it is used surprisingly heavily by locals in Nellmersbach. For this reason, setting up a **taxi-on-demand service can unleash enormous potential**. For one thing, more people can leave their car for a lot more trips, or possibly get rid of it entirely. On the other hand, extensive accessibility via the various booking options and the principle of “free taxis with VVS ticket” will most likely work from a marketing point of view, especially considering that 90% of the interviews viewed the use of on-demand service positively. Capacity research is required as to how many taxis would be necessary for this concept, since this will also involve costs in order to build the foundations in such a way that the high operational quality standard mentioned can also be maintained and the project is not due to an undersupply on the market “failed”. Through this study, it was evaluated that on-demand would be used with these criteria from the research group, which would be a partial answer to the research question. However, relying on taxi-on-demand will inevitably shift parts of the existing micro-mobility from a more climate-friendly mobility to the road, which, viewed solely in Nellmersbach, seems counterproductive for the climate. **Supra-regionally, it should bring the B14 commuters from the road to the rails** by making this on-demand service easier to reach junction stations and thus more climate emissions should be saved by shifting car journeys. If it is possible to get people with the on-demand service enthusiastic about public transport, then intermodal solutions in the rail infrastructure could be used.

The study was able to show that the expansion of the rail infrastructure continues to contribute to the core of a solution, which is suitable for the masses for increasing public transport usage in Nellmersbach: an above-average number of trips to the state capital should in future be made faster and more densely with public transport instead of the car. If it is purely up to the opinion of those to be interviewed, the beat should be clearly condensed, especially in the evening and at night. But considering Wurmthaler’s (2019) objections that the S-Bahn main route cannot be expanded and therefore there cannot be a 10-minute frequency on Stuttgart’s S-Bahn trains in the medium term, the concept with **accelerated S-Bahn trains between Backnang and Stuttgart terminal** station should be implemented in the agenda,

which was mentioned of five people in the study. This would also make it possible to increase the number of services to Stuttgart, which a large majority would like. The project would require a clear political commitment to maintaining the Stuttgart terminal station and its current rails to Bad Cannstatt. To be able to initiate the mobility turnaround in Nellmersbach, it is therefore important to improve regional accessibility by public transport, which could be ensured in future by taxi on demand, the rail transport should also continuously be upgraded in terms of travel times, frequency and operating quality.

Only if improvements are made at both the municipal-rural and supra-regional level, it will be possible to establish a form of mobility that can ultimately have the title “sustainable”, which therefore is future-proof and climate-friendly.

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These are the answers of the qualitative interviews.

1) male (around 30 years old)

- From Klaffenbach
- To Stuttgart
- not usually, but four times a year
- S-Bahn should be a 15 min frequency all around the day
- single ticket, he would use On-Demand, when he would be in Nellmersbach, but wouldn't buy a subscription. Only when MoD would be in Klaffenbach, he would take it.

2) female (around 20 years old) with mother:

- From Oberbrüden
- To Stuttgart
- 2nd time in 2022
- "S-Bahn frequency is ok, but how to get to Oberbrüden?"
- Single ticket, would only use MoD, when Oberbrüden is connected to the S-Bahn directly

3) male (around 30 years old)

- From Nellmersbach
- To Backnang
- Usually user of the park and ride
- S-Bahn frequency of 15 min is needed everytime
- VVS subscription offer, would use On-Demand

4) male (around 18 years old)

- From Nellmersbach
- To Stuttgart
- Use often park and ride but with the family
- Likes 15-min, but wants it to midnight
- Has a VVS subscription and would use On-Demand-Taxi

5) male (around 60 years old) with wife

- From Nellmersbach
- To Bad Cannstatt for a visit
- First time
- "Waiting to long for the S-Bahn"
- Single ticket, would use public transport more regularly when there would be a On-Demand

6) female (around 20 years old)

- From Hertmannsweiler
- To Stuttgart
- Have a month ticket on Nellmersbach park and ride
- "Frequency should be 15 min everyday from 5 to 24"
- VVS subscription, but is sick of commuting from Hertmannsweiler to Nellmersbach, so she would use definitively On-Demand

7) male (around 25 years old)

- From Erbstetten
- To Waiblingen and then to Stuttgart
- "park and ride is too expansive", wouldn't use it
- No comment about S-Bahn frequency
- Only VVS single day ticket, but would buy subscription, "if I could use On-Demand from Nellmersbach"

8) female (around 30 years) with two children

- From Weiler zum Stein
- To Bad Cannstatt, but also to grandparents in Tübingen
- Use often Nellmersbach's park and ride, because it's empty compared to Winnenden
- Frequency is too bad on the land
- Metropol ticket, On-Demand would be used and subscription would be bought, but then, she prefers a direct journey to Winnenden

9) male (around 20 years old)

- From Rudersberg
- To Munich via Stuttgart
- Use park and ride often here, because it isn't checked so often, whether the tickets are valid
- Frequency on the night must be better
- DB+city option, would buy single day tickets, but used the On-Demand-Service to Nellmersbach

10) male (around 25 years old)

- From Nellmersbach
- To Stuttgart
- Is often going by bike to the station, but today he's got luggage and his parents aren't at home in the moment, so he uses park and ride
- Frequency is too poor
- VVS subscription, would use On-Demand and also "would work as a driver in semester break"

11) female (around 30 years)

- not given (five kilometre)
- not given (direction to Stuttgart)
- uses more than three times a week park and ride
- wish that the frequency could be faster, but also the bus frequency to Winnenden could be better
- has a single day ticket, but wouldn't use On-Demand in Nellmersbach

12) male (around 50 years old)

- From Kleinaspach
- To Kleinaspach (back) – he wants to walk with his wife and want to take back the car
- 1st time here
- Frequency is good, the problem is in Kleinaspach
- 9€ ticket, but with a flexible On-Demand, he would buy a subscription of the VVS

13) male (around 30 years old)

- From Nellmersbach
- To Stuttgart
- Often use park and ride, that he can drive home in the night directly
- 15-minutes is ok, but should be 365 days in a year, also on weekends
- 9€ ticket, would use On-Demand for going to soccer, to Winnenden, to the supermarket or visiting friends

14) male (around 40 years old)

- From Rettersburg
- To Stuttgart
- In other station, he used it, he doesn't like paying something
- Higher frequencies of the S-Bahn could help
- 9€ ticket, has soon a subscription offer, because he will live in Bad Cannstatt soon, but think that On-Demand will be used here

15) male (around 50 years old) with a friend

- From Weiler zum Stein
- To Stuttgart
- 1st time, took a friend with, but don't want to drive car in Stuttgart
- S-Bahn should be 15 min, better 10 min and maybe with less stops
- 9€ ticket, but with On-Demand, he would buy a VVS subscription offer

16) male (around 80 years old)

- From Nellmersbach
- To Stuttgart Feuersee
- Often usage of park and ride, when he wants to go to the theatre
- S-Bahn frequency is with 15 min alright, but it has to be longer in the evening for the youth
- Theatre ticket, On-Demand shouldn't be complex, without app, but with button in every single 50m in Nellmersbach. Then he would buy a subscription for elder people to use it often

17) male (around 70 years old)

- From Nellmersbach
- To Maubach
- Hates driving car, but for him, it's necessary to come to the S-Bahn. Since his last operation, he has to rent a car
- S-Bahn should be in a better frequency, but therefore, they have to make a third rail between Backnang and Waiblingen
- 9€ ticket, including taxis in the public transport would be a "fantastic idea"

18) male (around 20 years old)

- From Baach
- To Baach (back)

- He was drunken yesterday, so he let the car on park and ride, when he came back from Stuttgart and took a taxi
 - S-Bahn frequency with 15 min would be a dream for him in Baach. But he wonders why Stuttgart can't reduce the frequency like other cities
 - No ticket, but he would use On-Demand to Nellmersbach from Baach, when it would be possible. If it's also in Baach, we would buy a subscription, but it should be with waiting times 10 min maximum.
- 19) male (around 25 years old)
- From Nellmersbach
 - To a highschool party in Stuttgart
 - 2nd time to use park and ride, because he has to much luggage and no one can bring him to the S-Bahn
 - "The people wants to be faster in Stuttgart. Often they use the car. But it's too expansive. We should have more possibilities with public transportation to commute faster. More buses to Winnenden as a MEX stop, a tangential connection to Burgstall and a connection to Remseck Neckargröningen"
 - VVS subscription. He has no idea with On-Demand, if it's easy, he would use it, but it's more important for people with less mobility
- 20) male (around 40 years old)
- From Weiler zum Stein
 - Not given, where he is commuting
 - Ignored, that he parked on park and ride, because he "was just eating"
 - S-Bahn is ok as it is
 - No ticket, On-Demand like taxis would be used more in Nellmersbach than the "lazy bus"
- 21) female (27 years old)
- From Jena
 - To Stuttgart and Baach the same day
 - 1st time park and ride usage in Nellmersbach
 - "Compared to Jena is 15 min frequency well-connected, but compared to other big cities, there should be more S-Bahn in the evening. 30 min, like to today, is only in the night intelligent"
 - 9€ ticket. Would use On-Demand, when it's included in the VVS
- 22) male (around 30 years old)
- From Hertmannsweiler
 - To Stuttgart
 - Doesn't know he was using park and ride here. He is parking here every weekend
 - S-Bahn frequency is okay
 - 9€ ticket, but normally single tickets. Would use subscription, if On-Demand-Service would be in Hertmannsweiler with a direct connection to S-Bahn stations
- 23) male (around 25 years old)
- From Nellmersbach
 - To Stuttgart with his friend
 - He was surprised that this is park and ride here, because he is parking more often here.
 - In the night, the S-Bahn frequency is sick, so many people are using the car. He hates car driving in Stuttgart and say that it's illegal to drive car when he is drunked.
 - 9€ ticket. On-Demand only would make sense, when it's 24 hours and is a offer in the night. Then he would have a subscription again, too.
- 24) male (around 40 years old)
- not given, where he is from
 - To Stuttgart
 - He doesn't wants to use park and ride, he was just thrown out of the car by his wife
 - The S-Bahn frequency is fine with 15 minutes. There should be the possibility to drive directly to Burgstall. Maybe there can be a S-Bahn circle without Backnang.
 - VVS subscription, for him On-Demand makes sense for older people. "Younger people should walk from their homes to the stations. If the young said, they need a car to go to Stuttgart, they are wrong. If they need one, only because of the poor bus relations around Nellmersbach to the neighborhood".
- 25) male (around 30 years old)
- From Affalterbach
 - To Leinfelden-Echterdingen
 - park and ride on the airport is too expansive, so he took the S-Bahn, with cheap park and ride options here
 - S-Bahn should be in a higher frequency like the U-Bahn – 10 minutes
 - He used a Rail and Fly option, On-Demand would be perfect and he would use it from Affalterbach to the S-Bahn. If it would be flexible, so he can go to other places in Backnang directly, he would be happy
- 26) male (around 25 years old)
- From Nellmersbach
 - To Stuttgart
 - Only every month, when he goes to the VfB or to the inner city of Stuttgart
 - S-Bahn frequency is okay, but bus services "sucks". He has to walk everytime from station over 1,100 m
 - Single tickets, On-Demand is for him "the solution", when it's integrated in a subscription
- 27) male (around 50 years old) with wife and two children
- From Welzheim
 - To Bad Cannstatt/ Wilhelma
 - Only to reduce stress in Stuttgart and save parking at the Wilhelma. It's the second time
 - S-Bahn frequency in Nellmersbach is okay, but the bus connection are rarely. In the future it will be a problem, because young wants to be mobile
 - Single ticket, On-Demand for Nellmersbach of course no impact, but he believes that all people in Nellmersbach would have a subscription then.
- 28) male (around 30 years old)
- From Rudersberg
 - To Stuttgart
 - Every 2 month, he is partying in Stuttgart and took some friends in Waiblingen, so they use park and ride
 - S-Bahn frequency should be better in the nights. But Rudersberg is a dead place, so Nellmersbach has got luck to stay on a S-Bahn
 - Single ticket, On-Demand is a cool idea, and he would buy a subscription in the VVS
- 29) male (around 60 years old)
- From Hertmannsweiler
 - To Stuttgart-Bad Cannstatt
 - 3rd time, but to reduce stress in Stuttgart because of parking management
 - S-Bahn is fine, but he never used it 5 years before
 - 9€ ticket, because he need to be in Stuttgart one time more, On-Demand is an interesting project, he would check it, but don't think a 10 min opportunity to 5 km arrivals is realistic
- 30) male (around 30 years old)
- From Nellmersbach
 - To Stuttgart
 - Often, when commuting to Stuttgart, "when friends can't bring me to a S-Bahn station", too foul to walk
 - S-Bahn is fine, but in the night there should be more frequency
 - 9€ ticket, On-Demand he would try and buy a subscription, when it's realized in Nellmersbach
- 31) male (around 20 years old)
- From Hertmannsweiler
 - To Stuttgart
 - 1st time so far
 - 15 min frequency is fine
 - 9€ ticket, On-Demand will change a lot for him, so he will have a subscription again.
- 32) male (around 30 years old)
- From Erbstetten
 - To Fellbach
 - usually every three weeks
 - big problems in the evening, because it's 30 min frequency

- this time 9€ ticket, but usually single ticket, On-Demand would be used, but he wouldn't buy a subscription
- 33) male (around 60 years old)
- From Nellmersbach
 - To Stuttgart
 - Often, when commuting to Stuttgart
 - Night better frequency
 - 9€ ticket, for On-Demand he would buy a subscription
- 34) male (around 50 years old)
- From the Degenhof
 - To Stuttgart-Bad Cannstatt
 - Sometimes, when traffic is too busy in Stuttgart
 - He thinks, having a S-Bahn line is really good
 - Isn't sure, which ticket he want to buy. On-Demand for Degenhof would be great and then he would have a subscription, only in Nellmersbach it wouldn't have an effect on him
- 35) male (around 50 years old)
- From Großerlach
 - To Stuttgart
 - Use often park and ride when going in the city centre, because traffic is too heavy and cities aren't carfriendly and "needn't to be"
 - S-Bahn is with 15 min frequency fine
 - 9€ ticket, because it made sense in June, "Taxi-On-Demand is for the suburban area the best solution"
- 36) male (around 20 years old)
- From Bürg
 - To Waiblingen
 - Not given, how often he used it
 - 10 min frequency would be perfect
 - 9€ ticket with a VVS subscription offer, "Taxi-On-Demand is a huge change for our mobility solution. If only one station would lying in Bürg, it will give some perspectives. Otherwise I have to find a room in the city soon"
- 37) male (around 30 years old)
- From Nellmersbach
 - To Stuttgart University
 - park and ride is often used in Winnenden, but this time in Nellmersbach
 - 15 min frequency is totally fine, when it's also in the late evening
 - VVS subscription offer, Mobility-on-Demand would be cool
 - The usage of the bus in Nellmersbach is very poor. Only the school bus and when work starts in Nellmersbach, it is well-used. When it's sunny in the week, people go to the Wunnebad directly. More people are using the bus in Leutenbach.
- 38) male (around 25 years old)
- From Nellmersbach
 - To Stuttgart
 - Often walk to the station, but today it was too hot
 - 15-min-frequency of S-train is enough, but he also would like to have it on Sundays
 - VVS subscription offer, would use On-Demand
- 39) male (around 40 years old)
- From Öschelbronn
 - To Stuttgart
 - Use park and ride four days a week
 - Critized that today there is a 30-minutes frequency, but it is okay with 15-min-frequency, when it's also in the evening
 - VVS subscription
- 40) male (around 70 years old) with daughter
- not given (20 kilometres)
 - To Bad Cannstatt
 - Haven't used park and ride before, because it was the idea of his daughter to take the S-Bahn
 - Has no experience with public transportation before
 - Single ticket, On-Demand he wouldn't use
- 41) male (around 50 years old) with wife
- From Nellmersbach
 - To Stuttgart
 - 1st time park and ride
- 10-minutes S-Bahn frequency like in Berlin, but better bus connections to Winnenden and a swimming pool there
 - 9€-Ticket, On-Demand could help them, but there should be capacities
- 42) female (around 20 years old)
- From Nellmersbach
 - To Freudenstadt
 - Rarely use park and ride and "don't like parking here"
 - Wants 15-minutes S-Bahn up to midnight
 - 9€-Ticket, would use On-Demand more often, also to go to a supermarket in Nellmersbach and wouldn't need a car anymore