



COMMUTING AND CAR USE: CAR PARK REGIMENTATIONS AS A POTENTIAL LEVER

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Abstract. The Institute for Transport Studies, University of Natural Resources and Applied Life Sciences, Vienna, Austria was commissioned by the provinces of Vienna, Lower Austria and the Burgenland to carry out an analysis, how the introduction of parking regimentations at work place is effecting the mobility behaviour of those concerned. Based on the results derived from telephone interviews in stated preference technique it can be verified, both the restriction of the number of places and the invention of obligatory parking pricing at company owned car parks is a powerful tool to support the policy goals of the city. In both cases, long term on street parking need to be restricted in parallel in order not to weaken the measure and to avoid an increase of car traffic caused by the search for vacant parking slots (more than 50% of the respondents could evade the measure in that way in the current situation).

Keywords: parking regimentation, commuting, mode choice, stated preference analysis, mobility management, company car park.

1. Introduction and objective

Work place travel is a crucial issue for conurbations throughout Europe as its clear peaks in the morning and evening are causing increasingly capacity problems and therefore are negatively effecting the whole conurbation. A characteristic of work place travel demand is the low flexibility in reducing the volume as necessity is obvious. Once consensus is found, that work travel demand needs to be accepted in principle, mobility management is required to offer solutions how to manage the situation. Among others, parking policy is widely seen as one proper tool to influence mode choice (Kinderytė-Poškienė, Sokolovskij 2008). For example, in the city of Vienna, on street short-term parking has been introduced and has proven as a story of success clearly affecting the modal split of work place travel within the city. Market always reacts to changes of the framework conditions and it was recognized quickly, that off-street parking on company owned car parks are not effected at all. To avoid developments not welcomed (i.e. increasing supply of private off-street company car parks to evade the measure), regulations have to be integrated soon. In order to discuss the options and to test the effect on the mobility behaviour in the Vienna region, the city of Vienna and surrounding provinces commissioned the Institute for Transport Studies at the University of Natural Resources and Applied Life Sciences in Vienna, to carry out a survey in stated preference technique on this topic (Sammer *et al.* 2005).

2. Good practice examples

Switzerland is a pioneer in regulations with regard to off-street parking places. In many sites binding mobility strategies were decided with a clear definition of acceptable traffic volumes per quarter, derived from the actual environmental situation. Within these plans parking traffic is included (e. g. in the “*Mobility Strategy City of Zurich 2002 – Subtask Parking Strategy*”).

As a good application example for implementing such a policy, is the IBM office building, Vulkanstrasse in Zurich (Switzerland), can be named, decided in 2001. The project is located in the vicinity of the railway station Zurich-Altstetten, ca 7 km outside the city centre and will host 1250 work places (taken from Allreal Vulkan AG project information leaflet – IBM AG Switzerland 2004). The building with 57 300 m² floor space consists of 2 parts, one part 7 floors and 14 floors the other one, the max height is 44 m. The building permit was given in Apr 2002, construction work started in June 2002, the investment sum is ca 129 mill. €. The building permit includes the limitation of the number of private off-street parking spaces, i. e. max 251 parking spaces are permitted. This corresponds to a ratio of 228 m² floor space for parking. Except for 15 parking spaces, all of them have to be constructed underground (decision on project plan of the office building Vulkanstrasse, city council of Zurich). Additionally, parking pricing and a mobility plan is obligatory for the site.

Similar but less strict requirements with regard to permitting off-street parking places exist in several US cities as well (Manville, Shoup 2005). In the US, in California, another practice example shows an interesting but different approach to the parking pricing (Shoup 1997). Under the title "parking cash out" companies pay their employees a bonus, if they do not use the company-owned car park.

3. Current parking policy in Vienna

Similarly to other European cities, the municipal council of Vienna decided to support public transport and non-motorized modes and to reduce car traffic in the transport master plan of 1994, in the program of climate protection 1999 and in the transport master plan 2003. Under the overall concept of sustainability 2 main goals were defined:

- avoiding traffic in terms of a mobility saving urban development and land management with a high life quality in the city and
- modal shift by behavioural changes, i. e. reduction of private car traffic to a share of 25% of all trips, increase of bike use up to a share of 8%, increase of public transport use from 34% up to 40% share and, additionally, the change of split of public transport and private car traffic from 35% to 65% up to 45% to 55% of cross-border traffic – mainly targeting commuter traffic.

To reach these goals a package of measures is determined in the concept. A part of them also concerns parking management. Beside *Park & Ride* policies the concept of parking management mainly includes a short term for street parking today. Street parking was first implemented in 1959 in the city centre. After that more and more road sections and small areas were integrated in the restrictions of short-term parking. About 16 years later the short-term parking areas became subjected to fees, before in 1993 a district-wide short-term parking zone was implemented. The system also includes residential parking which allows residents to buy long-term parking tickets, so the focus of the measure clearly lies on commuters using private cars.

During the following years zones were extended and today 10 districts out of 23 of Vienna are short-term in street parking zones. To evaluate the effectiveness of on street parking regulations the city of Vienna commissioned an impact analysis. Main results were that such instruments lead to a decrease of the parking load in the inner city, a reduction of illegal parking and less car traffic demand because of reduced search traffic. Especially the last point caused a reduction of air pollution and noise. For example, a before-after-analysis carried out in 1998 the reduction of car-kilometres travelled due to short-term parking led to a CO_2 reduction of up to 20% in some districts (Herry *et al.* 1998). Expanding the short-term parking concept to the whole city, a max potential of a CO_2 reduction of traffic emissions of 4% in the city could be expected. Therefore the Viennese parking management is assessed as a very effective tool of urban transport policy. This success leads more and more to considerations and discussions, whether off-street parking management could also be a proper tool to support goals defined in the master plan and to avoid shifts from in-street to off-street parking. Steer-

ing instruments like upper limits for private parking places as well as fees for operators of car traffic generating facilities are named in the master plan. It is pointed out that such regulations always have to be implemented in cooperation and coordination with neighbouring provinces, especially the Vienna surrounding province of Niederoesterreich to avoid migrations of companies preferring a good accessibility by car to surrounding areas (Sammer *et al.* 2007). Especially for Austria a legal basis already exists to implement measures like a tax for sites generating car traffic, but was never applied yet. This option is mentioned in the Federal Austrian Law Regulating Local and Regional Passenger Transport prepared in 1999 by the Austrian Ministry of Science and Transport in § 32(1) "Verkehrserregerabgabe" ("Traffic Generation Tax"). The revenues raised have to be used for measures increasing the quality of public transport in this case.

4. Characteristics of the methodology

In the current study, a survey of commuters was carried out via telephone in February 2005 using stratified random sampling of telephone lists for Vienna (40% of the sample), the province of Lower Austria (40% of the sample) and the province of Burgenland (20% of the sample). After the first telephone contact only persons travelled to work place by car on the day before the interview were selected and were asked for general information. Within this group, only those using a company-owned car park were selected for the stated preference analysis itself. This procedure created a net data set of 43 stated preference interviews (out of 709 persons contacted in total). Additionally, semi-structured interviews were carried out with operators of company car parks, discussing their point of view and collecting their arguments of pros and cons. Four interviews were carried out with representatives of craftsman's establishments and industrial plants, four interviews were carried out with representatives of office buildings and specialists well-experienced in the field of production site analysis and property development at the office or commercial property market to cover the category "buildings with office, administration or clinical practice space".

5. Reasons of car use expressed by the commuters

In comparison to those living in the provinces surrounding the city of Vienna (Fig. 1), the majority of the Viennese respondents explained their mode choice with comfort without any inherent necessity (36%). This confirms earlier studies (Grigonis, Paliulis 2007; Loukopoulos *et al.* 2004), where parking (free of use) is provided at a working place, many people make use of this and come to work by car without any inherent necessity. In the surrounding provinces the lack of public transport supply is clearly the driving force for car use (62%). As expected, the different situation of the quality and quantity of the public transport supply within and outside the city is reflected here. On the third place, the combination of the commuting trip with other activities restricts the freedom of mode choice (14% including all respondents), followed by the need of using the car during work or transport of goods between home and work place (7%). Travel time and especially the costs

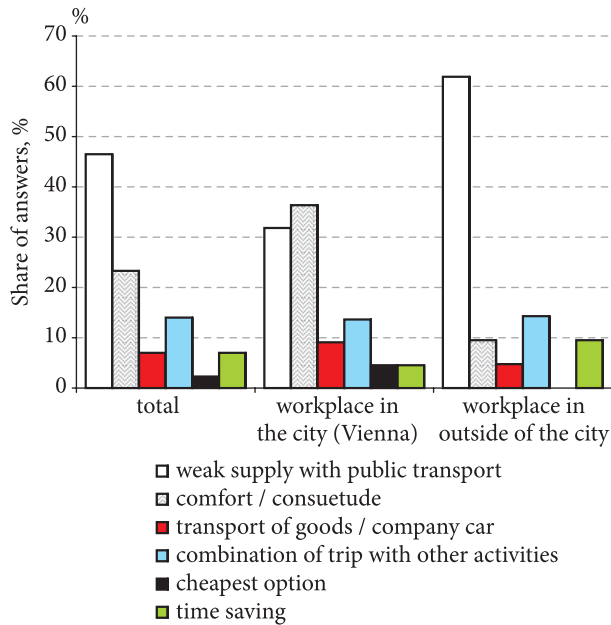


Fig. 1. Subjective reasons for mode choice of commuters using a car for work place travel and using the company-owned car parks, %

are secondary arguments, but, of course, represented indirectly within the other arguments as well.

6. Parking pricing at company-owned car parks

All commuters were asked for their hypothetical changes regarding to their mobility behaviour if parking pricing at the company-owned car park with different price levels starting with 60 €/month, 80 €/month up to 100 €/month would be implemented. At the current situation for the majority of the commuters the usage of the company owned car park is for free, ca. 10% reported on existing parking fees between 8€ and 48 €/month. This means for all of the respondents an increase of parking costs is already included, if implementing the lowest price level of 60 € in the scenario. As a first reaction to this scenario (at a level of 60 €/month) 22% of the commuters responded to park their cars along the streets in the vicinity of the company and another 29% at a level of 100 €/month. If responding in that way, these commuters were asked to confirm that on-street parking is not restricted (e. g. because of short-term parking), the supply is sufficient and it does not create any further costs (parking pricing for on-street parking places). From these answers it can be concluded, in case of inventing parking pricing up to 29%, the commuters can avoid strong effects on themselves, except for an acceptable longer walking distance between the car and the work place. At the same time the demand for street parking places will increase as well as car traffic volume because of searching for vacant parking slots, if regulation for on street parking in these areas will stay unchanged. Sufficient residential parking supply is one important indicator for sustainable cities (Viteikienė, Zavadskas 2007). This effect is able to weaken cities as a residential place. A possible solution is the transformation of these parking places into residential parking places with short-term parking for visitors only. An approach to optimising the overall amount of parking supply, taking into account the behav-

our of commuters was recently postulated in an US study (Hollander *et al.* 2006).

Fig. 2 shows the changes of the behaviour of the commuters in the sample, if parking on street would be no option because of adequate regulations such as described above (either existing or introduced in the scenario in parallel with the parking pricing measure for the company owned the car park). The respondent could give open answers regarding her/his reaction the scenario introduced by the interviewer. As a second step, the answers were grouped into types: accept and pay (and still use the car park), reducing the costs because of arranging car pooling (with colleagues), using public transport instead of the car for the whole trip, using public transport at least for the last section of the trip (park and ride) and using non-motorised transport modes. Whereas paying 60 €/month for a parking place will be accepted by 49% of the commuters, with increasing costs this share decreases clearly down to 16% (scenario 100 €/month), which is an indication of the share of captive drivers in the sample. The answers given are indicating a high potential of behaviour changes due to this measure with a clear preference to public transport either for a part of the trip or the whole trip. Car pooling and non-motorised modes, as alternative to the existing behaviour, are of secondary importance. These values show the max potential of behavioural changes as respondents always include specific assumptions in their answers (e. g. adequate public transport supply) or forget restricting circumstances (e. g. picking up the children from school after work without car can be much more complicated as assumed).

In Fig. 3 the stated changes of the behaviour are transferred into the effect of the mode choice. By increasing parking fees the share of private car trips decreases be-

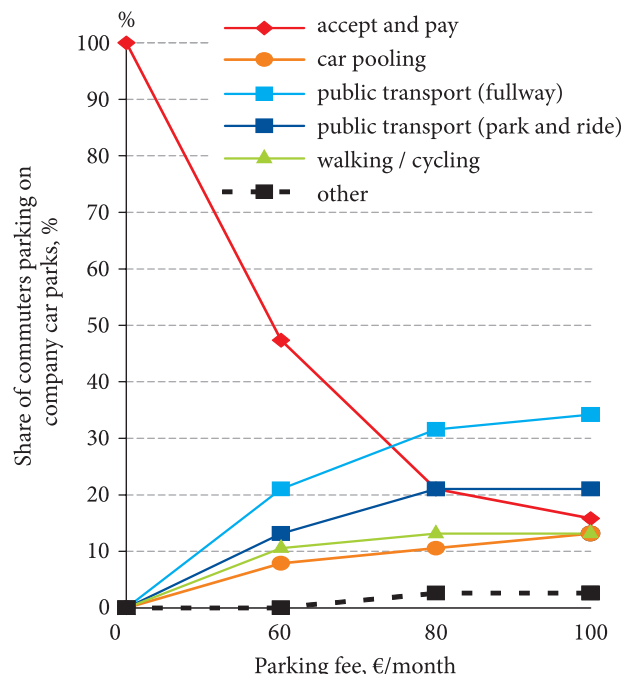


Fig. 2. Changes of behaviour, caused by parking pricing at company-owned car parks

cause of shift to other modes and a reduction of trips because of car pooling. Mainly public transport is profiting from these changes, as most of the commuting distances driven with private car so far are too long for reasonable substitution by non-motorised modes.

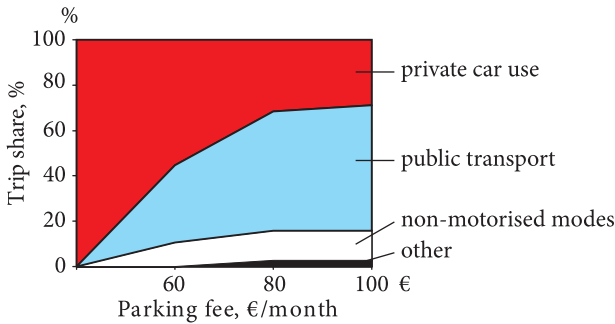


Fig. 3. Modal shift, caused by implementing the parking pricing at company-owned car parks

7. Restriction of company-owned parking places

The scenario includes the assumption that no free parking slots are available anymore because of a restriction of company-owned parking places by law. In this case the majority of the respondents replied to park on street in the vicinity of the workplace. Again it was discussed with the respondents, if this is a realistic option for their specific situation (availability of surrounding long-term parking places on street). 51.2% confirmed this as a realistic alternative. In the second step, the scenario for those respondents was extended with restriction for on-street parking places in parallel and the target persons were asked again for their preference under these new circumstances. Fig. 4 shows the results of both scenarios. The pillar on the right shows the change of behaviour without further on-street parking management activities. Beside the 51.2% of respondents using on-street parking, another 7.3% will use car parks with costs in the vicinity of their working place, but 41.2% of the respondents reported a change of their traffic behaviour. Like the results at the scenario parking pricing, public transport is the most preferred option for the respondents, followed by non-motorised modes and car pooling. In the left pillar, on-street parking is restricted for all respondents because of on-street parking management measures. The result shows, that 25.7% (answer type using park and ride and using a car park with costs) of the respondents need to use their car either to be able to leave their homes or need to have the car at the work place or after work as still opting for alternatives with a partly car use. Another 23.1% would try car pooling. Again public transport is the first alternative followed by non-motorised trips, if the mode choice changes.

8. Mobility management for employees

Within the interviews the acceptance and potential usage of job tickets (as the result of company mobility management) was explored additionally. The scenario includes a 20% fare reduction for seasonal tickets. 44% of the commuters using the company-owned car park replied positive the such an offer and stated to consider the usage of public transport modes.

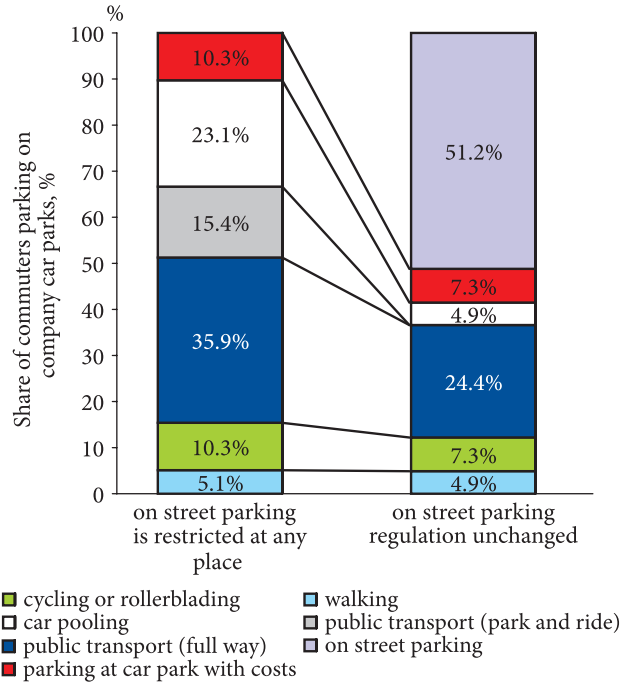


Fig. 4. Change of behaviour caused by the restriction of company-owned parking places

All other respondents were asked for reasons of not using this offer. Fig. 5 shows the results distinguished by the location of the work place. Commuters working in the surrounding areas of the city (province Lower Austria and Burgenland) mainly argued with the insufficient public transport supply. Other reasons are of secondary importance. For commuters working in the city centre loss of time and loss of travel comfort is the most dominant argument, insufficient public transport supply only of a secondary importance. Comparable results shows a Dutch and UK study on the issue (Rye 1999).

9. The operators' point of view

In parallel to the interviews with commuters, the measures were discussed with operators of company car parks in order to collect their point of views. In principle, these stakeholder groups are very critical, their arguments are as follows. They state, the limited number of parking places would arise disadvantages especially for estates with a high percentage of

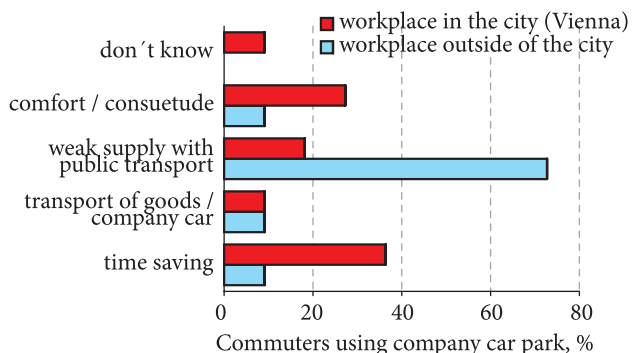


Fig. 5. Arguments for refusing the use of job tickets for public transport (20% fare reduction for season tickets)

field workers, who depend on car use and sometimes have to transport any goods in relation to their professional activities. Employees often have to be flexible, for example, in the case of emergencies and appointments (customer's service) and could not shift to public transport. Interviewees worry about an increase of parking search traffic and decreasing employee motivation. Most of the people surveyed assessed the limits comparable with those in the Swiss practice example as unacceptable low and as a high reduction of the actual car park capacity. One plant in Niederoesterreich would accept a less restrictive upper limit (≈ 1 parking place/90 m² floor space). In comparison to plants in Vienna centrally located, where a less restrictive max number of parking places would be barely acceptable, sites of the same company in the area of Niederoesterreich and Burgenland feel restricted too hard. During an interview, it was proposed to determine total limits of parking places for all properties of one company and to allow in-house allocation. Two of the interviewees said, that this restriction brings competitive disadvantages for new settling companies. They propose a regulation in combination with comparable measures for existing facilities. In all of the cases to settle down new sites in such restricted areas is seen problematically. The interviewees would rather consider a new settlement in regions far from the city centre instead of areas with a good supply of public transport.

The affected companies refuse parking fees for the user of their car-park as well. As reasons for their refusal a decreasing motivation of the employees, the administration's pressure to explain, an increase of bureaucratic effort and finally an additional financial burden of the companies were named. Nearly all the respondents mentioned a reimbursement for the users of the car park by salary (subsidies, social welfare payment). In two cases a zonal grading of fees according to the distance between the office building concerned and the city centre is seen as plausible, because higher fees for inner-city sites could be more acceptable than in rural areas. A fee of 60 €/month is named as "too high" or as "max upper limit". Just in case of two interviews companies surveyed answered that the regulation would not affect future site decisions. In all other cases operators would reduce the development of new sites and first of all would take a temporising position. A certain percentage of the revenues of the fees to the community is seen positive because it would be more comprehensible for the employees. It is proposed to use the money for subsidy of public transport tickets. A similar survey carried out in the UK led to similar results, the majority of respondents refused the implementation of such measures (Ison, Wall 2002).

10. Conclusions

Mobility management for company-owned car parks is a proper tool to initiate modal shift towards a more sustainable transport behaviour. Especially work place travel cannot be substituted easily, but causes peak hour problems and big traffic volumes daily. As expected and confirmed in the survey carried out, the restriction of the number of places at company-owned car parks is a powerful tool to support the on-street parking measures such as short-term parking and residential parking. The implementation of this tool is realistic for new sites only, and could be integrated in land use

plans – as practice example shows, e. g. in Zurich. Obligatory parking pricing is an effective alternative for existing company-owned car parks. Practice examples on voluntary basis indicates that owners of the companies are more likely to accept the implementation of this measure as existing parking pricing was reported already for the current situation in the interviews by about 10% of the respondents. However, the majority of operators of company car parks affected are in a strong opposition to the measure which is hindering a decision of politicians and confirm the need of communication and awareness activities in parallel to the invention of such a measure. For example, the offer of job tickets (e. g. with a reduction of 20% of the fare price) could support this tool.

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