

# **Attracting car drivers to Park & Ride (Swedish: Hur kan man få fler att använda infartsparkeringar?)**

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## **Abstract**

The increase in car traffic in many major cities has led to problems involving congestion and pollution. One proposed solution to the transportation problems could be to offer car users attractive Park & Ride lots with good connections to public transport. The aim of this research is to find out how to attract more car drivers to Park & Ride facilities and to investigate if there is a potential for increasing the use of Park & Ride facilities. The purpose is also to characterise these two groups and to understand the extent to which some factors influence the choice of using Park & Ride. Two studies have been conducted, telephone interviews targeting users and non-users of Park & Ride lots and a stated preference questionnaire by mail. The principal findings are that there is potential for increasing the use of Park & Ride facilities, especially among women and respondents over 30 years. Some 59% of the non-users say they are prepared to use it at least once a week. The results also show that individual security and security for cars are very important criteria for determining what makes a Park & Ride lot attractive. Both sexes assign a high value to secure parking, but women are willing to pay more for lights. The results reveal that parking facilities, such as free parking at work and short distance between parking place and work influence people's choice of mode. The telephone interviews show that in addition to good marketing and publicity, effective road signs guiding to the facilities and clear signs at the lots are highly recommended.

## **Introduction**

Problems associated with traffic, such as traffic congestion and pollution, have arisen in urban areas in particular. The use of cars has increased and it is estimated that by 2010 passenger traffic will increase by 17% (SIKA 2000). In Sweden, a total of 60% of all passenger journeys are made by car (SIKA 2000).

One proposed solution to many of the transportation problems is to offer car users attractive Park & Ride lots with good connections to public transport.

Whether the Park & Ride mode is chosen or not depends on many factors, such as the supply of public transport, the quality of the parking lot and parking conditions both at home and at the destination (Thurnbull 1995). According to a survey in Stockholm (RVU 86/87), 80% of the commuters heading towards the city centre have a parking cost that is zero or below 10 SEK a day and a parking space arranged within three minutes' walk from their workplace.

Other factors influencing the choice are time and cost savings compared with driving a car for the whole trip. The walking distance from the parking lot to the platform also has an effect on the choice of mode. Attractive lots usually have a distance of 50 m, while those with distances of more than 300 m are not used as frequently (Infartsparkering 1992). In a Norwegian study, the average walking distance from the parking lot to the platform is 133 m (Usterud Hanssen 1997).

In seeking to promote Park & Ride, it is desirable to understand the reasons for using or not using Park & Ride lots. Therefore the question arises of how to attract car users to Park & Ride lots.

In this paper two studies are shortly presented. The purpose of the first study was to find out how to attract more private car drivers to Park & Ride facilities and establish if there is a potential for increasing the use of Park & Ride facilities. The study describes both users' of these facilities and frequent car drivers' reasons for using or not using Park & Ride lots. Telephone interviews targeting the two kinds of groups, users and non-users of Park & Ride, were carried out.

The main purpose of study 2 was to define commuters' willingness to pay for different factors describing the quality of Park & Ride lots. Another aim was to investigate how background factors influence the choice of mode and how parking at the destination and home influence the choice of mode. This paper presents the survey design, commuters' willingness to pay and to some extent the factors that influence the choice of mode.

## **Method used for study 1**

The survey was conducted in a suburban area of Stockholm at three Park & Ride lots targeting people living near one of the Park & Ride lots (non-users) or parking there (users). The data was collected through telephone interviews in October 1999.

The users were asked to participate in a study about Park & Ride facilities when parking at one of the Park & Ride lots. If they agreed, an interviewer called at their home addresses.

After the users' home addresses were collected, the boundaries of the influence area were set to coincide with the area in which the users lived. Non-users were then called from a telephone register and asked whether they were willing to participate in a study about Park & Ride facilities. Those that agreed to participate were questioned directly on the line.

The chosen area included the Park & Ride lots: Vällingby, Åkeshov and Råcksta which are all situated along the same underground railway line (Green line). These lots were chosen because they are situated along a main road that suffers from congestion. However, the number of occupied spaces is quite low at these lots. At Råcksta, 23% of the spaces are occupied, while the figure at Vällingby (Bräcke­gatan) and Åkeshov is 42% (SL Konsult 1998b).

A screening question was asked first to obtain the right target groups. The respondents had to use their car as their usual mode for trips, regardless of the purpose. The screening question was put to the people who parked at one of the selected Park & Ride lots and to those who lived in the influence areas of the lots. The survey was designed to take no more than 15 minutes.

The group of users has been defined as the persons that were found parking at a lot on the day of the interview. Users and non-users were asked the same background questions, but different questions were asked about Park & Ride.

#### *Response rate*

A total of 158 interviews were completed. Of the completed questionnaires, 71 were users and 87 were non-users. 22 refused to participate and 143 did not belong to the right target groups.

### **Description of the lots**

#### *Vällingby*

Vällingby is fairly difficult to find and is therefore quite easy to drive past. Many turns are needed in order to park. There are 45 spaces and 42% of them are occupied. It costs 10 SEK to park here. The security at the lot appears to be satisfactory since it is possible for passers-by to see the parked cars. In addition to the underground railway, several buses serve the lot.

#### *Åkeshov*

At Åkeshov, it also costs 10 SEK to park. As there are no road signs from the main road, it is also difficult to find the lot, especially for newcomers to the area. Åkeshov has 166 spaces and 42% are occupied. The lot is in an deserted location, which makes it insecure for both people and vehicles. There are no services around the lot. There is a street nearby where parking is free.

#### *Råcksta*

Råcksta is also hard to find. There are two road signs, but the distance between them is long, making it difficult to find the lot. The facility has two floors and the top floor has no roof, which makes it easy for people passing by to see through. Otherwise, it appears to be well lighted. There are approximately 280 spaces. There are no buses that serve Råcksta, only the underground railway. However, there is a fast-food restaurant.

## **Questionnaire content**

### *Questions to both target groups*

Both user and non-user surveys collected general background information about household size, age, gender, children's ages, home and destination addresses, together with the age at which the respondents obtained their driving licence and when they started to use a car more frequently. The background questions were the same for the two groups. Questions about exercise frequency and type of exercise were also asked. They were also asked a question about how far they were willing to walk from a parking place to the platform. One question asked them what they thought would make more people use Park & Ride.

The respondents were asked questions about the road signs at the lot. The respondents were also asked to grade hypothetical negative aspects of a lot and to grade what characterises an attractive Park & Ride lot.

### *Questions to users*

In addition to the background questions and the questions mentioned above, the users were asked about their reasons for starting to use Park & Ride. They were asked to describe their usual trip from home to the final destination and whether any errands were done on the way. The respondents were also asked to say how they would have travelled if the Park & Ride lot had not existed.

### *Questions to non-users*

The non-users were asked questions about their knowledge of the studied Park & Ride lots and whether or not they would use them and if so with what frequency.

## **Method used for study 2**

A postal study was conducted using the stated-preference approach and, in addition to hypothetical questions, socio-economic characteristics were collected together with the commuters' travel information for all their travel opportunities and their commonly mode of transport for work trips.

The survey was designed to define commuters' willingness to pay for different aspects of Park & Ride lots (called factors). The factors were: price of parking, security at the parking lot, availability of spaces at the parking lot and walking distances between parking lot and station. Table 1 describes the factors and levels. Logit models have been used to find the respondents valuation of the factors.

Table.1 Description of the factors and levels

<i>Factors</i>	<i>Levels</i>
<i>Parking fee</i>	<ul style="list-style-type: none"> <li>◆ No cost to park</li> <li>◆ It costs SEK 5</li> <li>◆ It costs SEK 12</li> <li>◆ It costs SEK 25</li> </ul>
<i>Security at the P&amp;R facility</i>	<ul style="list-style-type: none"> <li>◆ Unguarded, no lights</li> <li>◆ Unguarded, with lights</li> <li>◆ Guarded, has a roof</li> </ul>
<i>Distance from parking space to the platform</i>	<ul style="list-style-type: none"> <li>◆ It is 25 m to the station from your car</li> <li>◆ It is 100 m to the station from your car</li> <li>◆ It is 300 m to the station from your car</li> </ul>
<i>Availability of spaces at the parking lot</i>	<ul style="list-style-type: none"> <li>◆ You are sure of getting a parking space at any time</li> <li>◆ You do not get a parking space once a month</li> <li>◆ You do not get a parking space once every other week</li> <li>◆ You do not get a parking space once a week</li> </ul>

Each respondent was presented with eight pair wise choices. Figure 1 gives an example of these questions.

1 You are on your way to work and wish to use the Horthus parking lot next to Danderyd Hospital. Which of these two alternatives do you prefer?

**Alternative 1**

It costs SEK **5 a day** to park

It is **100 m** to the station from your car

The parking lot:

- is **guarded, has lights**
- has a **roof**

You **always get a parking space** for your car.

**Alternative 2**

It costs SEK **12 a day** to park

It is **25 m** to the station from your car

The parking lot:

- is **unguarded**
- has **lights**

You **always get a parking space** for your car.

**I prefer:**

**Alternative 1**

**Alternative 2**

**Either of them, can't choose**

*Figure 1 An example of a stated-choice experiment*

The users of Park & Ride lots were asked to participate in the survey when parking at Räcksta or Horthus (a lot situated in the northern part of Stockholm area). The non-users were collected through car numbers when passing a specific point of the two Park & Ride lots.

At the end of May and the beginning of June 2002, 925 of 2150 commuters who were called or asked agreed to participate in the survey had a questionnaire sent to their home addresses. The main reasons for not participating were that the commuters did not belong to the target group, that they did not commute between the target hours or that they did not commute or pass through the requested destination area.

### **Useful answers**

A total of 925 individuals agreed to participate in the study and had a questionnaire sent to their homes. 633 questionnaires were sent back after one reminder call and 629 questionnaires were used in the analysis. This represents a response rate of 68%. This is a quite low response rate when considering that the pilot study received a rate of more than 90%. The pilot study was conducted in April while the main study was conducted in May and June which could explain the low response rate. Multiple phone calls were done in order to get in contact with the respondents. In addition to the questionnaires excluded from the study, there were individuals who did not answer all questions or misunderstood a question.

## Results and discussion

A high travel standard is the single most important factor when it comes to increasing the market share of public transport. However, measures of different kinds are needed to attract car drivers to other modes of transport. They include a combination of restrictions on the car, such as road tolls, car-free zones, parking fees, improved conditions for pedestrians, cyclists and public transport, communication in the form of campaigns and information, not to mention incentives. Badly implemented measures can both be ineffective and create opposition to public transport measures.

This research reveals that parking conditions at work influence the choice of mode. In overall terms, the majority of the commuters who use a car as the main mode do not have any monthly *parking costs* at work while about half the Park & Ride users have parking costs. Overall private car drivers have shorter distances between parking place and work. A conclusion is that if a commuter has good parking conditions at work he/she is more likely to use car as the usual mode. Other studies support this finding.

The results of this work provide an insight into the potential for increasing Park & Ride. Most likely to consider using Park & Ride are those that started to use the car more frequently at the ages of 26 to 30. Some 59% of the non-users say they are prepared to use it at least once a week. Even those that already use Park & Ride frequently are willing to use it more. However, it must be remembered that people do not always act as they say they will.

The studies have shown that the availability of space at the Park & Ride lot is important when it comes to determining whether or not people are going to use Park & Ride. More spaces at the lot or charging a fee to park at the lot are possible solutions.

More men than women say that they would never Park & Ride. Women appear to be more in favour of Park & Ride than men.

Men start driving more frequently at an earlier age than women. If a non-user has started to use a car more frequently at the age between 26 and 30 years and is a woman, she is most likely to consider using Park & Ride at least once a week.

If the Park & Ride lot had not existed, 9% of the users say that they would drive all the way to work. This indicates a change in modes. However, almost half the Park & Ride users would choose public transport for the whole trip if the Park & Ride lot were not available. This means that care must be taken when introducing Park & Ride in order not to compete with the local bus or those using bicycle to the station.

### Measures to attract car users to Park & Ride

One of the most important measures that was proposed is more knowledge about Park & Ride. People have a limited awareness of and information about the public transport system and Park & Ride. Some of the ideas that were mentioned by the interviewed people are good marketing, publicity and better road signs. Other important measures were security for both vehicles and individuals, followed by a high frequency of buses and trains. Many users

mention not being able to rely on the train to be on time or even worse the train not arriving. Other people say it should be free to park.

In order to get more car drivers to use Park & Ride, it is essential to present figures relating to the time and cost savings when using public transport. In general, both non-users and users mention the importance of saving time and money. This therefore appears to be an important aspect getting more non-users to use Park & Ride.

Furthermore, many of the interviewees pointed to the uncertainty of getting a parking space. More parking spaces at the lots might solve this problem. Some respondents would even like larger spaces for cars. This could be a reaction to the more common use of large cars such as vans and jeeps.

Another suggestion is better accessibility to the lots. It should be easy to walk from and to find the way between parking place and platform. It is also desirable to have signs with the next departure time of buses and trains.

If car users are to be attracted to Park & Ride, it is necessary to ensure a smooth transition to public transport. The lot should not be something you have to spend time looking for. The *distances* between the Park & Ride lot and platform should be short. The distance received the highest score among the negative factors at the Park & Ride lot. On average both users and non-users are prepared to walk no more than 300 m. Finding and reaching the lots must not be overly complicated and the payment system, if one exists, must be straightforward. At the same time, Park & Ride must not compete for the people who use public transport for the whole of their journey or bicycle to the station. One solution would be to improve the conditions for bus passengers and cyclists, at the same time as a Park & Ride lot is built.

As *free Park & Ride* lots are the most frequently selected option of measures among both users and non-users of Park & Ride, this appears to be an important measure in order to transfer car drivers to Park & Ride. However, the studies have shown that there is a willingness to pay for guarded lots and available parking spaces. So a fee could be recommended at lots that are overparked or have rectified their security problems. Security is mentioned several times by the respondents throughout the questionnaires as being an important factor and it is also assigned a high value in the studies.

The suggestions put forward by the two target groups differ slightly. The users' ideas for increasing the use of Park & Ride are more closely associated with improving their specific parking lot. The non-users suggest more general, wider solutions, such as tolls, banning cars in the city centre and raising the parking fees in the city. Non-users select a congestion charge of SEK 30 as a good way of making car drivers use Park & Ride more frequently than users.

### **Valuation of quality factors at Park & Ride facilities**

Commuters value a *guarded lot* more highly than being *guaranteed a parking space*, as can be seen in Table 2. The willingness to pay for an *unguarded lot with lights* is half the willingness to pay for a *guarded lot*. So lights could be an economical measure in order to make the lot more secure.



<b><i>The factors at the Park &amp; Ride lot:</i></b>	<b><i>Willingness to pay</i></b>
<i>Guarded lot with lights and roof</i>	SEK 11
<i>Guaranteed a parking space</i>	SEK 7
<i>Lights on an unguarded lot</i>	SEK 6

Table 2 The willingness to pay for some of the factors.

Women and men have the same willingness to pay for a *guarded lot*, but women value an *unguarded lot with lights* more highly than men. One explanation of this result could be that women place a higher value on their individual security than men. Lights would make women feel safer, while guards make both men and women feel security for the car.

### Internal validation

Both Park & Ride studies reveal that individual security and security for cars are very important criteria when it comes to determining what makes a Park & Ride lot attractive. However, the three methods that have been used produce slightly different results. The method used in Study 2, stated preferences, shows that a *guarded lot* has a higher value than being *guaranteed a parking space*, see Table 2. When asking about the measures that would make commuters start to use Park & Ride, a guarded lot comes much further down the list of suggested measures. In addition to the measure of making it free to park at the lot, being *guaranteed a parking space* and *easy to find and park at the lot* are suggested measures. In Study 1, the respondents grade security more highly than free parking. One explanation of the slightly different results could be that the question was asked in different ways. For example, in Study 2, the respondents were asked to choose three measures from 14 available on a list of measures that would make them use Park & Ride more frequently or start to use it. However, in Study 1, the respondents were asked to grade five factors, one at a time. In this question, being guaranteed a parking space was not one of the factors. One explanation of why the fee received lower scores than security could be that the ratings were made independently of each other.

<b><i>Method</i></b>	<b><i>Stated-preference method used in Study 2</i></b>	<b><i>Ranking of 14 measures that would make commuters start to use Park &amp; Ride Method used in Study 2</i></b>	<b><i>Grading of five factors that make Park &amp; Ride lots attractive, Study 1</i></b>
<b><i>Ranking of factors</i></b>			
<b><i>1</i></b>	No fee at the lot	No fee at the lot	Security at the lot
<b><i>2</i></b>	Guarded lot	Guaranteed a parking space	High frequency of buses
<b><i>3</i></b>	Guaranteed a parking place	Easy to find and park at the lot	Parking at the lot is free

Table 2 The two most important factors using three different methods.

The most highly valued quality aspect on the lot is security for both individuals and vehicles. The problem of security is mentioned several times throughout the questionnaires, which

clearly indicates the effect of the factor on making Park & Ride attractive. In spite of the different scores of the quality factors, the ranking of the factors is similar for gender. However, security is valued more highly by women than men, while men give higher scores to high frequency of buses and trains.

Different kinds of service such as fuel and food had the lowest priority. One explanation could be that it first has to be safe to park and there has to be good public transport from the Park & Ride lot. Once these conditions are fulfilled, there might be a demand for different kinds of service.

A general conclusion is that this thesis has contributed with knowledge about attractiveness of Park & Ride but also under what parking conditions do people chose the car or Park & Ride. That the probability of choosing car depends on the parking conditions at work is common knowledge. However the result about parking conditions at home should be looked at with care due to the imperfection in the questionnaires. Factors that make a Park & Ride attractive, the potential for increasing Park & Ride and valuation of quality factors of the Park & Ride lot are other results from the studies. The choice model created in study 2 describes the choices between Park & Ride facilities.

## References

Engström et al., *Infartsparkeringar - Knutpunkter i trafiksystemet: Reserapport*. Transportforskningsberedningen. TFB meddelande 163; Stockholm

GLAB, *Göteborgs lokaltrafik AB, marknadsundersökning 1997* ref i Lind and Schmidt 1998

*Infartsparkering 1996/97, Underlag för Dennisöverenskommelsen*, Region- och trafikplanekontoret, RTK, Stockholm 1992

Lundin, A; *Försöksverksamhet med nya symboler vid utmärkning av infartsparkeringar*, Stockholm, 1998

NCHRP, *Effective use of Park & Ride facilities. A synthesis of highway practice*. Synthesis 213, TRB, Washington D. C., 1995

Park & Ride för Göteborg – Förstudie; Göteborgs Gatukontor Trafikutredning, Göteborg 1991

Picket and Gray; *The effectiveness of bus-based Park & Ride*, TRL report 207, England, 1996 (ref in Lind and Schmidt 1998)

RVU 86/87, *Resvanor, tidsanvändning och besöksmönster*, RTK, Stockholm, 1992

SIKA, *Uppföljning av de transportpolitiska målen maj 2000, Sika rapport nr 5, Stockholm, 2000*

SL Konsult, *Marknadsundersökningar*, Stockholm, 1998a

SL Konsult, *mätningar 1998*, Stockholm Parkering, Stockholm 1998b

Turnbull, K, F; *Effective use of park-and-ride facilities*, National Cooperative Highway Research Program. Synthesis of highway practice 213, Washington DC, 1995

Usterud Hanssen, J; *Parkering: et virkemiddel i samordnet areal- og transportplanlegging*; Transportøkonomisk institutt. TØI rapport 349, Oslo 1997