

Summary:

Interchange in Public Transport in the Oslo Region

It is neither possible nor rational to develop a public transport service whereby everyone can travel from door to door without having to change buses during their journey. Such a service would offer low frequency and a large number of parallel routes. Public transport users must therefore be prepared to change buses. Thus it is necessary to develop good interchanges in order to produce the best possible levels of head way and cost effectiveness.

Method

The method used here is known as *Stated Preference* (SP). The SP-method is based on the interviewees making hypothetical choices between different transport /service alternatives.

In this study, we will look firstly at the results from the Stated Choice questions. The advantage with the stated preference methods is that a number of attributes are evaluated simultaneously, because the respondents weigh up several attributes at the same time.

The facilities at the interchange are not included in the Stated Choice section. Ideally, the facilities at the interchange should be attributes in the Stated Choice section. In this way, the respondents could weight up the different facilities at the interchanges. At present, we do not have this type of data, and thus an estimate has been made by looking at the evaluation of changing public transport mode in relation to the concrete facilities at the spot where the respondent changes mode. This can give us a good indication of the preferences the respondent has with regard to facilities at the interchange.

Design

Changing buses was included in the stated preference sequence in that the journey time by bus is included within the price of the journey. Changing buses is divided into four levels (table S.1).

Table S.1: Characteristics and levels in the second stated preference sequences. Number of observations: 7499

Characteristics	Level 1	Level 2	Level 3	Level 4
Price per journey	Basis -	Basis	Basis +	
Basis= price per journey	25%		25%	
Journey time	Basis -	Basis	Basis +	
Basis = Journey time by bus	25%		25%	
Changing buses	No change	Change with no waiting time	5 minutes wait	10 minutes wait

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Recruitment and percentage replying

The sample was drawn at random from the Population Register. Those selected were aged 14 years or older. All had an address in Oslo or Akerhusus. Those who were selected received a letter by post with an Internet address and a user name/ password to log onto the survey. Those who did not have access to the Internet could fill out a questionnaire on paper.

The total percentage replying was 29.4 per cent.

Major resistance to having to change buses¹

The disadvantage of having to changes buses can be divided into two:

1. **Resistance to having to change.** In addition to the fact that it is inconvenient to have to change buses, such resistance can also be attributed to the fact that public transport users are uncertain whether they will get a seat on the next bus or whether the next bus is running. This resistance is measured by looking at changing buses when there is no wait involved – i.e. direct changes.
2. **The extra waiting time** which accrues when changing buses. This change time cannot be

¹ In this study public transport modes include bus, subway, tram and train. To simplify the text "bus" for all the modes.

deselected in the same way as the waiting time for the first bus. The passenger decides when they are going to arrive for the first bus. They can come just when the bus is due, with the risk that they may not catch the bus. When changing buses, all the waiting time is compulsory: all public transport users who are changing buses have to wait equally long.

The resistance to changing buses is relatively high. The disadvantage of having to change buses without having to wait (direct change) is valued at NOK 3.65 per journey. Waiting 10 minutes between two buses is regarded as a disadvantage corresponding to about NOK 17. If the waiting time is reduced to 5 minutes, the disadvantage is reduced to around NOK 10.

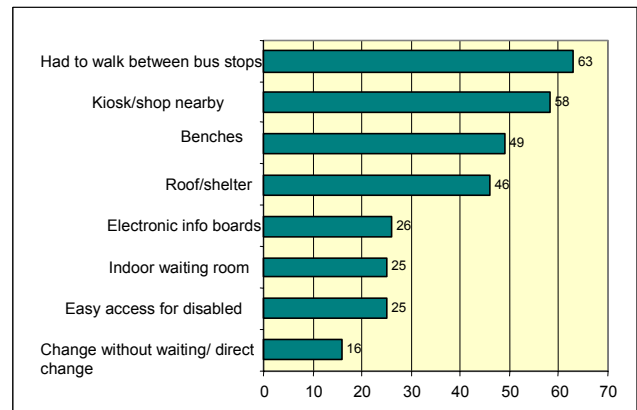
Experience of changing leads to lower resistance to changing

The analyses give an indication that those who have changed buses, and those who have not evaluate changing differently. These are results which are known from earlier studies (Kjørstad 1994 and Sjøstrand 1997). The difference can be interpreted in a number of ways; firstly it may indicate that a worsening of the public transport provision is experienced as having greater significance than the positive experience of an improvement. Secondly, it could be said that those who actually change buses are those who have experience of what it is like to change buses en route and that their resistance to changing should be given the most weight. This could mean that there may be a certain degree of "protest" to introducing change in the choices given to those who do not have to change buses at present. Another possible interpretation is that those who have the greatest resistance to changing are those who have consciously chosen a form of transport or a route which does not involve having to change.

Facilities at the interchange

Those who have to change buses described the characteristics of the place where they change. Over 60 percent marked the category "I had to walk between bus stops" (figure S 1.). Almost 60 per cent of those who changed buses en route changed at a spot where there was a shop or kiosk nearby. Just under half changed buses at a place with benches and/or a roof/shelter. About a quarter changed buses where there

were electronic information boards and easy access for the disabled.



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Figure S.1: Changing buses – facilities at the interchange. The respondent could indicate several categories. Percentage of those who had changed buses. N=489. Source: Stated preference analyses for Oslo and Akershus 2002

Resistance to changing buses is lower if there is a kiosk/shop nearby

The lack of a shop or kiosk in the vicinity of the interchange explains a large part of the resistance to changing buses. This contributes to resistance to changing buses equivalent to NOK 4.50 per journey. Public transport users can use the time between changing buses to run necessary errands at the shop or kiosk. As well as shopping, the kiosk/ shop can lead to better information and improved safety.

Waiting time in this survey are relatively short and the chance to go the shop or kiosk is thus small. Shops and kiosks can have an option value for many, even if they do not use the shop or kiosk, in that it can be seen as an advantage to be able to use the shop if necessary.

When asked directly, almost one third of public transport users replied that it was insignificant whether or not there was a shop or kiosk nearby, and few felt that it was important. In calculations from the paired choices, the absence of a shop or kiosk explains a good deal of the resistance to change. This can be interpreted to mean that it is not the shop or kiosk in itself which is significant, but the indirect consequence thereof. If there is a shop or kiosk at the interchange, this means that there are people there who can be approached if there is something someone is uncertain about. As well as better information, shops/kiosks nearby can have a reassuring effect on people who do

not feel safe. Staff in the shop or kiosk means that there are people around, which can have a calming effect on some public transport users. Interchanges where there is no shop or kiosk nearby can, for example, be situated along heavily trafficked roads and the resistance to changing buses can thus express a resistance to pollution and noise.

Poor access for the disabled explains some of the resistance to changing buses

If there is poor access for the disabled, resistance to changing buses increases. Poor access for the disabled contributes about NOK 3 towards resistance to changing buses.² Adapting interchanges for the disabled does not only benefit the disabled. For example, parents with pushchairs and people with large pieces of luggage find access easier if adaptations for the disabled are in place. Furthermore, the interchange may appear more open and surveyable which in turn can contribute to people feeling safer and more comfortable.

We see that the lack of a roof/ bus shelter at the interchange contributes to the disadvantage by an equivalent of about NOK 1 per journey, but this effect is not significantly different from zero.

Having to walk between bus stops

We see that having to walk from one bus stop to another explains more of the disadvantage of changing when the waiting time between buses is 5 minutes than when it is 10 minutes. When people have to walk from one bus stop to another, the change time is valued at NOK 2.50 per journey, while changes with 10 minutes change time are valued at NOK 0.30 per journey.

When people have to walk from one bus stop to another, 5 minutes between departures is perhaps too short to be sure that someone is going to catch their next bus. With 10 minutes change time, people are possibly more certain that they will catch their next bus.

Changing without having to wait and short distances to walk are important

All those who replied via the Internet were asked a direct question about how important the different factors were for their experience of the place where

they would have to change buses. Almost three quarters regard changes without having to wait and short walking distances as very important. We also see that a kiosk or shop in the vicinity is important for almost one third of respondents. This applies to all respondents, whether or not they had to change buses, there are no major differences in the answers between those who had to change buses on the actual journey and those who did not.

What about those who do not have to change buses at present?

This survey is based on a concrete journey and the facilities which are found at the actual interchanges. Those who did not have to change buses during the actual journey were not asked about the facilities at the interchange and thus they do not affect these evaluations. Previously, we have found that those who do not have to change buses regard changing as a greater disadvantage than those who are used to having to change. We can thus conclude that those who do not have to change buses might see the lack of facilities at an interchange as a greater disadvantage than those who are used to having to change.

² This explanatory factor is not significantly different from zero.