

Summary:

Targeted public transport

Part 3: Passengers evaluation of public transport provision

Background and problem scenario

The purpose of the project is to find a suitable segmentation of the public transport market, based on public transport users' preferences.

The problem scenario used in this report is the extent to which differences exist between different groups of passengers, which could form the basis for targeting public transport provision to a greater extent.

In the report, we highlight different passenger groups' evaluation of central characteristics of public transport provision: walking times to and from bus stops, frequency, journey time, changing between various forms of transport, shelters at bus-stops.

The analyses of the different passenger groups are divided into three:

1. The significance of background variables: gender, age, main employment and income.
2. The significance of access to cars and use of public transport.
3. Characteristics of the journey itself: vehicle accessibility and the purpose of the journey.

Based on analyses of different passenger groups, we have drawn up an analysis model which could form a possible basis for developing a more differentiated public transport service.

Methodology

Stated choice analysis

We have elected to use a method which is known as "Stated Choice". Stated choice analyses are based on those being interviewed making hypothetical choices between different alternatives. In order to make the situation as realistic as possible, the method is based on a concrete journey which the respondent has undertaken.

Thereafter, different "packages" are described, which the person being interviewed has to choose between.

In practice, stated choice analysis requires finding out the passengers' relative prioritisation of different improvements in public transport provision. In order to compare passenger preferences, we have converted the parameters to values measured in Norwegian *kroner*.

Target group

The analyses are largely based on results from two stated choice studies which together cover samples from six average - size urban areas: Kristiansand, Moss, Skien/Porsgrunn (Grenland), Tromsø, Ålesund and the Drammen region. The target group for the studies were people over the age of 16 who used public transport at least once in the previous month. 73 per cent of population had not used public transport in the previous month. The sample is not representative for the entire population, but for the 27 per cent who had used public transport in the previous month.

The choices are units

A total of around 1400 home interviews were carried out in the six urban areas. Since each person makes several choices in each round, we now have some 2000 observations on the basis of the interviews in the Drammen region and around 10,800 observations on the basis of the interviews carried out in the five average size urban areas. Thus the data material comprises some 13,000 observations. These observations form the units in the study.

Description of the rounds

In the study, the respondents were asked questions about the first or the last journey by public transport they had undertaken on the previous day. The respondents were then asked to choose between two alternative bus journeys, where different elements within the bus journey varied. The choices varied, as shown in table S1.

Table S1: Factors which vary and levels of choices. Rounds 1 and 2 in the stated choice studies in Drammen (round 2), Moss, Grenland, Kristiansand, Tromsø and Ålesund (rounds 1 and 2)

	Spill 1				Spill 2		
	Level 1	Level 2	Level 3		Level 1	Level 2	Level 3
Price	25% lower price	Same price	25% higher price	Price	25% lower price	Same price	25% higher price
Walking time to bus stop	2 mins	5 mins	10 mins	Journey time	25% shorter journey time	Same journey time	25% longer journey time
Frequency	50% greater frequency	Same frequency	50% less frequency	Seat	Seat for whole journey	Seat for half the journey	Standing for the whole journey
Bus shelter	Yes	No		Changing bus	Direct journey	Changing to bus already waiting	Changing with 10 mins wait

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The concrete journey, about which the respondents were asked questions, was used as the starting point for the variations in the different elements in the transports packages offered. This is the first or last journey by public transport which the respondent made on the last day when he or she used public transport

In each round, the respondents were offered up to nine choices, where the quality of the different elements vary. Based on the respondents' choice, the evaluation of the different elements is calculated. These evaluations are used in the analyses.

Hidden waiting times

Evaluation of frequency can be used as an expression for evaluation of hidden waiting times by assuming that the hidden waiting time comprises *half of the interval between departures*. It is precisely the waiting time between departures which is seen as a disadvantage with low frequency, and it is desirable to reduce this when one wants to increase the frequency. For example, the hidden waiting time with 30 minutes frequency is thus calculated to comprise 15 minutes. If the frequency *increases* to 20 minutes between each departure, the hidden waiting time is reduced by 5 minutes, to 10 minutes.

Significance tests

It is important to be sceptical about studies based on hypothetical choices. Firstly, it is difficult to undertake realistic weighting of imaginary choice situations. Furthermore, over - high requirements may be demanded of those interviewed, in that too many factors may vary simultaneously or the questionnaire may be too long. It is therefore necessary to test the results from the analysis.

It is the *choices* which form the units when we analyse passenger evaluations of the different journey time components. In this context, it is important to note

that possible bias in the sample is stronger in the evaluation analyses, since the same respondents make several choices. Furthermore, it is important not to be blinded by the large amount of data. Even though we have between 11,000 and 13,000 observations (depending on the type of analyses we make) the basis is the choices made by 1,000 – 1,400 respondents. We have tested the variations in the passengers' evaluations by calculating confidence intervals for the estimates. We have calculated the confidence interval at two significance levels (5 % and 10 %).

Passengers' journeys by public transport and preferences

27 per cent frequently use public transport, and many use a single ticket.

When recruiting for the study, the person concerned was asked whether they had used public transport in the previous month. 27 per cent used public transport at least once in the last month and are therefore within the target groups. The majority of those interviewed are frequent users of public transport. 62 per cent of the sample used public transport at least three days a week, 22 per cent at least one day a week. This means that over 80 per cent in our sample use public transport relatively often.

The average price for a single tickets for the journey made by the respondent is 18 kroner. The journey time to the bus-stop took on average 5 minutes, waiting time at the first bus-stop was also 5 minutes. Journey time using public transport took 21 minutes (on average).

Half the respondents travelled using a single ticket while only 10 per cent used monthly or fortnightly bus passes for their journeys.

The average passenger's preferences for improvements to public transport provision

Passengers are willing to pay almost twice as much to reduce walking time to/from the bus-stop as for reducing journey times on public transport.

The passengers' evaluation of journey times on public transport depends on whether they get a seat or not. The journey time using public transport is regarded as a greater disadvantage without a seat than with a seat.

The hidden waiting time is regarded as a greater disadvantage than the journey time (when one has a seat). This means that the average passenger is willing to pay more to increase the frequency (and thus reduce the hidden waiting time) than to reduce journey times.

Passengers regard having to change buses as a disadvantage, both the act of changing itself and the time it takes to do so. However, resistance to changing buses is greater amongst those who do not change than amongst those who have to change buses during their journey. Passengers are willing to pay for provision of station buildings or shelters at bus-stops.

Different passenger groups' preferences

We have shown how background factors, transport resources and characteristics of the journey affect preferences for improving public transport provision. Below, we will show the main features.

Men value increased frequency more highly than women do

Men are more willing to pay than *women* to reduce the hidden waiting time, i.e. to increase frequency. There is also a tendency for men to value other journey time - reducing components, such as reduced walking time and journey times on public transport, more highly than women. This indicates that men are more concerned with reducing the journey time - and thus achieving a more effective journey time - than women. For their part, women are more concerned with increasing the standards of bus-stops than men are.

Adults and young people are the most willing to pay for improved public transport provision

Where *age groups* are concerned, young people (16 to 19 years) and adults (36 - 66 years) are generally more willing to pay for improvements in public transport

provision than younger adults (20 to 35 years) and the elderly (67 years and above).

Pensioners are less willing to pay than other groups

The clearest tendency with regard to the connection between type of employment and preferences for improving public transport provision is that pensioners stand out in that they have a lower evaluation than other groups.

The connection between income and willingness to pay for improved public transport provision

Those who belong to *higher income groups* are more concerned with saving time than other groups. There is a tendency for those with high incomes to be more willing to pay than others in order to reduce walking times. Those with a high income also value journey time more highly than others, i.e. they are willing to pay more than others to reduce journey times. The high income groups are also more willing to pay to be able to travel directly, rather than having a 10 minute wait. Those with low and average incomes generally seem to be less willing to pay for improvements in public transport provision.

Access to cars and use of public transport has little significance on the evaluation of public transport provision

Access to cars generally (in the form of holding driving licences and having access to cars in the household) is only significant for evaluating changing between buses with 10 minutes waiting time. Those who have access to a car regard changing buses with a waiting time as a greater disadvantage than those who do not have access to a car. There is a tendency for those who have *a vehicle available* which they could use for their journey to evaluate walking time and hidden waiting time more highly than those without access to a car. However, this tendency is not significant.

Use of public transport has no significance for their preferences for improving public transport provision.

The purpose of the journey is significant for evaluating public transport provision.

Those who undertook optional journeys evaluated walking times and hidden times more highly than others, i.e. in that they are willing to pay more than others to reduce walking times and increase frequency. Those who made obligatory journeys value bus shelters more highly than others.

Table S2: Tendencies in analysis models, evaluation of journey time components distributed according to purpose and phase of life

	Obligatory journeys			Shopping trips			Optional journeys			
	16-19 years	20-35 years	36-66 years	20-35 years	36-66 years	67 years+	16-19 years	20-35 years	36-66 years	67 years+
Percentage who undertook journey	75	61	57	25	30	69	19	13	13	27
<i>Evaluations</i>										
Walking time	+	-	+	-	+	+	+	-		-
Hidden waiting time 1	+	-					+	-	+	-
Journey time with seat.								+		-
Journey time standing room only	+			-	+	+		+		-
Direct change										-
Change with waiting time				-		-				-
Bus shelter	+	-	+	-	+	-	+	-	+	-

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Phases of life and the purpose of the journey - a basis for targeting public transport provision?

The starting point for the analyses in this report is to chart whether there are market segments with corresponding needs and requirements, where the potential is large enough for differentiated provision to be considered. Our analyses showed that background factors, particularly age (phase of life), are significant for the evaluation of public transport provision. Characteristics of the journey itself, particularly the purpose of the journey, are also significant for how passengers prioritise different journey time components.

We have combined the two central factors of *life phase* and *journey purpose* to find out whether this way of segmenting the personal transport market might be suitable for differentiated public transport solutions. The main characteristics in the analysis are shown in table S2.

With such a fine distribution, there are few connections which are significant. The finds must therefore first and foremost be interpreted as *tendencies*, which it may be interesting to analyse more closely in another context. In table S 2, we used a plus sign (+) where the analyses show a tendency for this group to value journey time components more highly than one or more of the other groups (within the same journey purpose) and a minus sign (-) where the analyses show a tendency for this group to evaluate journey time components *lower* than one or more of the other groups.

Tendencies in the analysis model

Young people (16-19 years) want good standards of public transport provision

The youngest age group appears to have high requirements for the standard of public transport provision in relation to other groups, independent of the journey purpose. They want the time which is used walking to and from bus stops to be short, they want a certain standard of bus stops and they want greater frequency of departures. Young people are also more willing to pay than other groups to avoid standing during the journey on obligatory journeys.

The young people of today are also the transport users of the future. If public transport by young people is regarded first and foremost as having few advantages, the majority will start using cars as soon as they have the opportunity. It may therefore be short-sighted not to take account of the needs and demands of the youngest passenger group.

However, it is not possible to say anything certain about whether the requirements for public transport will change when the youngest age group moves up into other life phases, or whether this tendency is a warning that public-transport users in general will make higher demands for public transport provision in the years to come.

Young adults (20-35 years)

The main tendency among young adults is that in general they have a lower evaluation of a number of journey time

components than young people and adults, independent of the journey purpose. The exception is that they appear to value journey time by public transport more highly than others on optional journeys, whether or not they have a seat.

"Middle-aged" people (36-66 years) are willing to pay for improved public transport provision.

Adults, as well as young people, value a number of journey time components more highly than other age groups. This applies to walking time and shelters on obligatory journeys, walking time, journey time with standing room only and bus stop shelters on shopping trips and it applies to hidden waiting time and shelters on optional journeys. Even though the adults have a higher evaluation of fewer elements than the youngest group, there is still a tendency for the adults to set higher demands for public transport provision than the younger adults and the elderly.

The elderly (67 years+) are less willing to pay than others, particularly on optional journeys

Our results may indicate that the elderly, perhaps to a greater extent than other groups, may feel that public transport provision cannot be adapted to their requirements, but that they themselves must adapt to the existing provision. This tendency applies particularly to optional journeys, but also on shopping trips, some of the journey time components are valued less by this group than others. This may be connected with the fact that this generation is more easily satisfied and is not used to setting such high requirements for public transport as younger generations.

Evaluations according to journey purpose

The most interesting fact regarding *obligatory* journeys is that the group of young people stand out by setting higher demands than others, with regard to walking time, hidden waiting time, journey time with standing room only and bus shelters.

On *shopping trips*, walking time and journey time while standing are evaluated more highly by adults and the elderly than by other groups. The fact that elderly people evaluate these elements more highly on shopping trips may be connected with the fact that they become physically more tired than the other groups. It is less clear why the adults value these elements more highly than others. This may be connected with the type of shopping trip which is being made, for which we have no information.

On *optional journeys*, walking time, hidden waiting time and bus shelters are valued more highly by young people than by others. Hidden waiting times and shelters are evaluated more highly by adults than others, while the journey time is evaluated more highly by young adults than by others. It seems that young people in particular want improved public transport provision on this type of journey, similar to the tendency for obligatory journeys. However, both adults and young adults evaluate improvements in standards of individual elements more highly than others on this type of journey.

Conclusion

In our analyses, we have found that different passenger groups have different preferences for improvements in public transport provision, but that the differences are on the whole, relatively small. There is a need for greater knowledge about characteristics of the passenger groups and of the character of their journey purposes. Only then will it be possible to give clear advice with regard to how public transport provision can be better differentiated towards market segments where there is a potential for increasing public transport usage.

In the analyses, we have seen that young people in particular (16 - 19 years) prioritise the need for improved standards in public transport highly. The youth group should be analysed more closely to obtain more detailed knowledge about the types of journeys this group makes and the needs which are connected with the different types of journeys. There is also a need for more knowledge about young people's motives for choosing public transport over and above other forms of transport. This is important in order to keep this group as public transport users when they become adults

Where the journey purpose is concerned, a number of studies have already been carried out regarding obligatory journeys (school and work journeys). A large proportion of public transport journeys are to and from school and work, and it is important that public transport provision is adapted to this type of journey.

At the same time, it is important to obtain more knowledge about journeys for other purposes. Increased knowledge of what characterises shopping trips and optional journeys is of great significance in analysing the potential for increased use of public transport. In order to find an appropriate segmentisation of the transport market for people, it is, in other words, necessary to have greater knowledge about shopping trips and the character of optional journeys, and the needs which different groups have regarding this type of journey.

In our sample we have only included people who have used public transport at least once in the previous month, which comprises around one-third of the population. A large proportion of these use public transport often and have a relatively good knowledge of the public transport provision they use on a daily basis.

Our results indicate that those who primarily use public transport have relatively homogenous preferences for improvements in public transport provision.

It is possible that a larger sample would clarify some of the differences between passenger groups which we have found in our analyses. However, the results form a basis for emphasising that targeting public transport provision must not be extended too far, because the market base could then be too small. In many contexts, it may be more useful to adapt the existing public transport provision so that the service covers more user groups' needs, rather than implementing specially designed measures targeted at a given customer group.

Costs and passenger usage of differentiated provision - examples

The purpose is to indicate the conditions under which differentiated provision would be financially feasible with some concrete examples. The numerical examples

show a method and structure, which can be used to evaluate other types of differentiated public transport provision.

We have used examples from the evaluations amongst different passenger groups to illustrate how knowledge about public transport users' preferences can be used when different types of provision are to be weighed up against each other.

Even if improve public transport provision reduces generalised journey costs, and thus provides an improved service for those who use it, this does not necessarily mean that the investments are socially and economically profitable. This will partly depend on how many benefit from the improvements. The passengers' total benefit of a changed public transport provision would depend on the size of the change in public transport provision, the evaluation of this change and the number of passengers who would benefit from the change.

If we know the size of these factors, we can calculate the *total value* of the different provisions. If we set these up against what they cost, we will be able to see if the benefit, measured in kroner, exceeds the cost. We have used three examples to show how such weightings can be calculated.