

## How passengers value public transport attributes and improvements

Research provides a comprehensive suite of results and analysis about the inter-relationship between price and quality, and passengers' willingness to pay for service improvements for public transport.

In December 2011, the Transport Agency engaged Douglas Economics and Associated Consultants to conduct research into pricing strategies and service quality improvements for public transport.

The study looked at the trade-off between price and quality for bus and train users in Auckland, Christchurch and Wellington. The study had two main aims.

- To establish willingness-to-pay values for public transport service level and quality attributes (ie how much passengers are willing to pay for particular service attributes or improvements); and to calculate these values both for particular groups of passengers, and as an average for passengers as a whole, to establish the proportion of passengers who are willing to pay more for each improvement.
- To develop a method that could be used to assess the impact that improvements to bus and train services and infrastructure are likely to have on public transport patronage and revenue. This method could also be used to provide incentives for service operators to make improvements, and to identify the most appropriate improvements for use in New Zealand.

This research, conducted between November 2012 and May 2013, involved face-to-face surveys with a total of 12,557 public transport users. Two questionnaires were used to provide different customers insights: a rating survey completed by

7,201 passengers (57% of the total); and a stated preference survey completed by 5,356 passengers (43%).

Neil Douglas of Douglas Economics explains how, as far as the researchers could establish, this use of a 'hybrid' approach, combining the two types of survey questionnaires, was new.

'By using a rating survey with a stated preference survey, we were able to develop a flexible and cost-effective method that can handle different packages of improvements. As well as being able to value new buses and trains, and new facilities for bus stops and station upgrades, the approach can value changes in operational factors, such as cleanliness, graffiti and staff,' says Neil.

The survey covered contracted urban bus and train services, longer-distance rail services (in the Wairarapa, and between Auckland and Pukekohe) and outer Christchurch bus services, as well as the Wellington Airport Flyer, which operates and offers a premium unsubsidised bus service at higher fares. Altogether, services operated by 15 bus companies and two rail operators were surveyed.

In addition to vehicle and stop and station quality, the study covered service frequency, time spent on the bus or train (in-vehicle time) and fares. Including the latter three factors enabled the research team to value changes in vehicle quality and stop and station quality ratings in minutes and dollars, and to estimate differing values of time under different conditions.



## Key findings

A snapshot of the key findings from the research is presented in the table below. This is just a small selection of a comprehensive suite of results and analysis about the inter-relationship between price and quality, and passengers' willingness to pay for service improvements. The full research report (available online from the Transport Agency's website: see address above) provides a detailed three-volume presentation of the research and its outcomes.

### Key findings from the research project

#### Value of in-vehicle time

- The study estimated an average value of in-vehicle time of \$9.09 per hour, which was 50% higher than the equivalent figure of \$6/hour given in the Transport Agency's *Economic evaluation manual*. The value of time was found to increase with passengers' income, from \$5/hour at 'zero' income to \$18.50/hour at \$135,000 per year.
- As well as providing a 'basic' value of time, the study was able to quantify the effect of vehicle quality on the value of time. Respondents were willing to pay \$5.40 to save an hour travelling on a very poor quality vehicle, and travel instead on a very good one.

#### Value of service interval

- The survey covered low and high frequency services in the peak, off-peak, evening and weekends. By asking passengers about wait times, as well as the service interval (minutes between departures), the study was able to estimate a mathematical relationship between frequency and waiting time.
- In general, the service interval was valued less than in-vehicle time, with a minute of service interval being equal to 0.7 minutes of in-vehicle time on average. However, this valuation was not constant, varying between being equal to the value of in-vehicle time for high-frequency services, and only around 0.2 for hourly services.

#### Value of vehicle and stop and station quality

- The rating questionnaire asked respondents to rate their vehicle (bus or train) and the stop or station where they boarded in terms of a list of attributes on a 1-to-9 scale, with 1 being very poor and 9 very good. Two types of model were then estimated on the data. First, the respondent's overall rating was explained in terms of the characteristics of the vehicle or stop (using local authority data) and the profile of the passenger. Second, the variation in the overall ratings was explained in terms of the variation in the individual attribute ratings to attempt to determine the relative importance of each of the attributes. The large sample sizes meant that the parameters in both models could be estimated

### Key findings from the research project

with high statistical accuracy.

- Passenger ratings of vehicle quality ranged from 65% to around 85% across the 43 bus and train corridors in Auckland, Christchurch and Wellington. The study estimated that passengers' willingness to pay for the 20% rating difference was worth around 32 cents of the \$4 average fare (or 8% per trip).
- Compared with an eight-year-old standard bus, passengers were willing to pay a 5.9% higher fare for a new train, a 4.7% higher fare for a new 'premium' bus, 2.5% for a new trolley bus and 1.6% for a new standard bus.
- The profile of passengers was found to influence their vehicle ratings. Females tended to rate their bus or train higher than males by around 1.6%; retired passengers rated 5.5% higher; and young respondents (<18 years old) 3.5% lower.
- As well as providing an overall rating, passengers were asked to rate a set of vehicle attributes. Ride quality, staff and outside appearance were found to be the three most important attributes in terms of their ability to explain the overall vehicle rating. As with the overall ratings, the importance of various attributes was found to vary by passenger characteristics. Females, for example, placed more importance on the inside cleanliness of the vehicle and less on environmental impact when compared with males.

#### Analysis of bus stops and train stations

- In terms of bus stops and train stations, the average bus stop ratings ranged from 60% to 81% across 35 bus routes, whereas the range in average rail station ratings varied by only 61% to 71% over eight rail routes.
- For bus stops, the overall rating was found to range from a low of 46% when no passenger facilities were provided, to 75% at bus stops where shelter, seating, real-time information and a timetable was provided. Analysis of the relative importance of individual bus-stop attributes showed that cleanliness and absence of graffiti, weather protection and seating were the three most important attributes. Passengers' willingness to pay for facilities was valued at 9% of the fare for providing a shelter, 3% for seating, 3% for real-time information and 2% for a timetable.
- A similar analysis for train stations, showed passengers rated stations that had been upgraded within the previous 10 years at 7.1% higher than stations that had not been upgraded, and stations that had been upgraded within the previous five years at 10.4% higher. The analysis valued a station upgrade to be worth 6% of the average fare within the first five years and 4% in the second five years.

## Next steps

The rating survey gave passengers the opportunity to comment at the end, generating over 1,100 responses.

‘These comments, although naturally influenced by the subject of the survey, provide some useful suggestions for the Transport Agency, regional transport authorities and bus and train operators to consider,’ says Neil. ‘A similar number of respondents also provided their email address, providing scope for further survey work to be carried out, for example to track changes in passengers’ attribute ratings for a given service over time.’

Since completing its New Zealand research, Douglas Economics has conducted similar research

using the same hybrid survey approach in New South Wales and Victoria in Australia.

‘Ultimately, it would be useful to compare and contrast the New Zealand, Sydney and Melbourne values, thereby widening the range of vehicles, stops and stations covered’ says Neil. ‘There could also be merit in surveying Dunedin, Hamilton and the smaller towns of New Zealand, and of adjusting the survey for use with ferry users. Re-running the survey after major changes have been made to particular bus or rail services would also be interesting. All this information would help build a clearer understanding of what impact price and service quality have on public transport patronage and revenue.’

