



# National Passenger Survey

## Detailed technical survey overview

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## **1. Background**

Passenger Focus (and before it OPRAF and the Strategic Rail Authority) set up the National Passenger Survey (NPS) in 1999. The aim of the NPS was to provide customer views on rail company performance on a consistent basis, so that comparisons could be made between the various companies. Over time, data from the NPS has been built into the franchising contracts with train companies, making the results an important commercial dimension of running a Train Operating Company (TOC). Given this, the sample design, fieldwork standards and accuracy of assigning journeys to specific TOCs are of the greatest importance. In addition, large enough sample sizes are required for each TOC to ensure that performance changes can be seen in the marketplace.

The first NPS was run in Autumn 1999 and it has been run twice a year since then. The first seven waves were undertaken by The Oxford Research Agency, until the contract was offered at competitive tender in Autumn 2002. In December 2002, Continental Research was appointed to run the survey from Spring 2003 until Spring 2007.

This document outlines the methodology used in the Spring 2006 survey, the seventh undertaken by Continental Research. The aim of this document is to provide information on all key aspects of methodology, including the detailed sampling plan used in the Spring 2006 survey and all area definitions used to generate analyses.

## **2. Sample design**

### **2.1. Overview**

NPS uses a two stage cluster sample design for each Train Operating Company (with Silverlink split into Metro and County). The first stage sampling unit is a train station and questionnaires are then distributed to passengers using that station and that Train Operating Company on a particular day at a specified time.

Stations are selected for each TOC using a pps (probability proportionate to size) basis, using the estimated number of passengers as the size measure. A large station may be selected several times. Days of the week and times of day are then assigned to each selected station, using profiles for different types of station. Finally, the sampling points are assigned to weeks at random during the survey period.

### **2.2. Detailed sampling plan**

The full sampling plan actually used in this wave is shown in Appendix D to this document. The key principles of the design are as follows

- the railway network is divided into 26 basic building blocks. These are the 25 Train Operating Companies, but with Silverlink split into County and Metro
- for each of these 26 building blocks, data was provided on the number of passengers who use each station
- stations were then selected probability proportional to this passenger volume figure. A returned sample of 16 questionnaires per shift was assumed (this being the average from several waves). This means that all stations with a sample size of 16 or more are bound to be selected, and one with a sample size of 160 would be selected 10 times. Stations with a sample sizes below 16 may or may not be selected. Each selection was termed a shift
- a day of week was then assigned at random to each shift, in proportion to the day of week profile provided by the TOCs
- all shifts were allocated a three hour duration
- a time of day was then assigned, with probability proportional to passenger volumes. The day of week profiles were determined separately for city centre and other stations and separately for weekdays and weekends. The table below shows the time of day distributions that were used for this assignment.

## Time of day profile of passenger journeys

(derived from Wave 9 NPS data)

| <b>city centres</b>   | <b>%</b>       | <b>%</b>       | <b>%</b>     |
|-----------------------|----------------|----------------|--------------|
| <b>time band</b>      | <b>weekday</b> | <b>weekend</b> | <b>total</b> |
| <b>06:00 – 10:00</b>  | 8.02           | 0.33           | 8.35         |
| <b>10:01 – 13:00</b>  | 19.48          | 15.88          | 35.36        |
| <b>13:01 – 16:00</b>  | 22.01          | 5.91           | 27.91        |
| <b>16:01 – 19:00</b>  | 25.32          | 0.37           | 25.69        |
| <b>19:01 – 22:00</b>  | 2.52           | 0.16           | 2.68         |
| <b>total</b>          | 77.35          | 22.65          | 100.00       |
| <b>other stations</b> |                |                |              |
| <b>time band</b>      | <b>weekday</b> | <b>weekend</b> | <b>total</b> |
| <b>06:00 – 10:00</b>  | 48.73          | 0.51           | 49.24        |
| <b>10:01 – 13:00</b>  | 27.93          | 10.78          | 38.70        |
| <b>13:01 – 16:00</b>  | 5.98           | 0.79           | 6.77         |
| <b>16:01 – 19:00</b>  | 4.99           | 0.04           | 5.03         |
| <b>19:01 – 22:00</b>  | 0.26           | 0.00           | 0.26         |
| <b>total</b>          | 87.88          | 12.12          | 100.00       |

### 2.3. Sample size

Each TOC has a target sample size. Initially, this was set at 500 for each TOC. However, the sample size for all London and South East TOCs was raised to 1,000, to allow separate analysis of peak and off-peak journeys. The complex route structure for One, South Eastern, Southern and South West Trains led to the sample sizes for each of these franchises being increased to 1,500. All long distance services (GNER, First Great Western, Midland Mainline, Virgin West Coast and Virgin CrossCountry) were increased to 1,000 sample size in 2001.

Scotrail sample size was increased to 1,000 due to its complexity, whilst Island Line was reduced to 250 due to its simplicity. Distribution of questionnaires at stations was found impractical for Island Line, due to the short time between ferry and train arrival/departure times, so questionnaires are handed out on the trains. Finally, sample sizes for new franchises Arriva Trains Wales, Trans Pennine Express and Northern Rail were set at 750, 1,000 and 1,000 respectively, reflecting the relative complexity of the routes making up these franchises.

As well as providing data for existing TOCs, NPS also provides data for a number of 'virtual' TOCs. For the Spring 2006 Wave, these 'virtual' TOCs were Greater Wessex and GN/Thameslink.

Data for these virtual TOCs is derived from the main survey itself, using the 26 building blocks (prior to Wave 9, data for virtual TOCs was produced from adding in data from booster shifts and involved extensive re-weighting of the original data. This meant that there was a loss of consistency between the original data and that derived from these boosts). The data for the virtual TOCs for Wave 14 was constructed as follows (merely combining the relevant building blocks)

- greater Wessex – FGW (First Great Western), First Great Western Link and Wessex
- GN/Thameslink – WAGN and Thameslink

Each PTE area except Nexus has a target sample of 500 interviews. The Nexus area is so small that any journey starting in the Nexus area counts towards the PTE analysis and the target sample size is 250. The definition of which stations fall in each PTE area is at Appendix E.

Finally, Silverlink Metro requires separate analysis and is measured directly from its building block in the main survey, with no booster shifts required.

### 2.4. Weighting

Although the sample is designed to generate the right number of responses from each type of station, differential response rates mean this does not happen in practice. Furthermore, although the sample shifts are allocated to days and times to generate the "right" profile of passengers, weighting is employed to ensure that the estimates provide sound estimates that do relate to the TOC as a whole.

The questionnaires analysed for each TOC are weighted by

- station size stratum
- weekday/weekend
- journey purpose (Commuter/Business/Leisure).

GNER is also weighted to 15% First Class, 85% Standard Class. Finally, the data for each TOC is grossed up to the estimated number of passenger journeys for that TOC. This means that the weighted data for a number of TOCs can be simply aggregated (e.g. to generate data for a virtual TOC or a TOC type).

All the data used in this weighting was provided by TOCs in Spring 2002. Appendix F gives the data used in the weighting regime for the main survey in Spring 2006.

## **2.5. Questionnaire distribution**

The key features of the way questionnaires are distributed are

- questionnaires are handed out evenly across an interviewing shift, to ensure as wide a spread of passenger types and journeys as possible
- passengers are given a self completion questionnaire and a reply paid envelope
- the passenger's name and phone number are taken, for back checking purposes
- for the Spring 2003 wave onwards, the time of giving out the questionnaire was noted as well as the customer's sex and observable age
- passengers were also asked the purpose of their journey, using the same codes as in the questionnaire itself
- at Central London termini and at Gatwick Airport, only passengers for a selected TOC are given questionnaires. At most other stations, questionnaires are given to any passengers about to board a train (although some shifts are targeted at specific TOCs to ensure overall quotas are met)
- questionnaires are station specific, with the station name and the TOCs calling at the station pre-printed on the questionnaire
- from the Spring 2003 wave onwards, all questionnaires have a 11 digit serial number pre-printed. The first four digits are a station code, the next four a shift code and the final three a sequence number
- from the Spring 2004 wave onwards, the station name is personalised throughout the questionnaire and all questionnaires are scanned rather than having data punched

All distribution of questionnaires occurs between 07.00 and 22.00, during a three hour shift. The number of questionnaires distributed depends upon the station, day of week and time of day and ranges from 65 at a busy city centre station on a weekday to 15 at a small rural station.

## 2.6. Data verification

Many checks are undertaken on NPS data, before a questionnaire is allowed to pass through for analysis. Most of these revolve around checking that the journey claimed by the respondent is feasible.

The questionnaire now asks the respondent to record where they disembarked from the train they boarded when given the questionnaire (Q1b). The respondent is also asked to list any subsequent stations where they changed trains and their final destination (Q2b/c). There is a need to check that the first leg journey as recorded is feasible and also that the destination of this leg is served by the TOC the respondent claimed to use.

When questionnaires are received back from respondents, these initial checks are carried out using the electronic railway timetable, from RailPlanner. The checks that are made are

- does a train leave the origin station at the time stated by the respondent?
- if so, is it a service of the TOC defined by the respondent?
- if so, does it call at the station written in at Q1b?
- if so, is this station different from the origin station?
- if so, accept the data. If not, set aside for further investigation
- does the train terminate at a Central London station and if so, is this before 10:00 on a weekday? This question is used to define morning peak journeys in London and the South East.

The data entry system does not accept any journey that violates any of these tests. Such questionnaires set aside are investigated by the research executive team. From the Autumn 2004 Wave onwards, a question has been added to the questionnaire, to identify if any part of the first leg of the passenger journey was undertaken by replacement bus service, rather than by train. All such journeys are eliminated from the database, so that all journeys monitored by NPS now include train only journeys, with no part by replacement bus service.

If a stated time is just a minute or two different from a journey which is valid in all other respects (correct TOC, destination called at by train, no other TOC runs a service near this time), then the journey time may be altered and the questionnaire accepted.

Once the questionnaire has been scanned, a set of reports highlighting potential errors and unusual incidences is produced, which act as final checks that journeys are valid. These Reports include identifying any questionnaires where

- the origin and destination station are not valid for the TOC used
- the origin and destination station are the same

Among these error/incident reports are lists of Silverlink journeys, which could have been on either the County or Metro components of Silverlink (basically journeys between London Euston, Harrow and Wealdstone and Watford Junction. In each case, lists of eligible stations are used as the first check and then journeys which could be either element are checked manually. For example, a Silverlink journey between Watford Junction and London Euston could be either Silverlink County or Metro, it is only by examining the timetable that the decision can be made.

## 2.7. Response rates

In the Spring 2006 survey

- 77,163 questionnaires were distributed to passengers
- 27,475 valid questionnaires were returned by 10 April, the cut-off date for analysis (35.6%)



- a further 345 valid questionnaires have been received by 11<sup>th</sup> May, pushing the response rate up to 36.0%.

### 3. Derivation of key factors affecting customer satisfaction

Before the first wave of NPS was undertaken in Autumn 1999, TORA undertook some preliminary research. The aim of this research was to identify all the issues that passengers felt important to them as part of their rail journeys, so that all such issues could be monitored in NPS.

This initial research comprised

- a qualitative element (eight focus groups and seven depth interviews among disabled customers), to generate the list of dimensions passengers viewed as important to them
- a quantitative element (conjoint analysis) to rank these dimensions and identify the most important of them

From this initial research, a list of 25 key factors was derived, and these have been used in all thirteen waves of NPS. Two additional measures, relating to personal security at the station and on the train, were added in Autumn 2002, bringing the total number of factors to 27.

One element of the new contract awarded to Continental Research in December 2002 was a requirement to validate the list of dimensions used since Autumn 1999, and see if it was still relevant. There were two aspects to this

- are all the factors currently measured important to rail passengers in evaluating their journeys
- are there any factors missing from the current list.

Two approaches were used to answer this

- multivariate analysis was undertaken on all data from Waves 1 to 7, to see how much of the variation in overall journey satisfaction was explained by the 25 factors collected in each of those waves. The notion here was that if most of the variation in overall journey satisfaction was explained by these factors, there were unlikely to be any key missing factors. In the event, only around 65% of the total variation in overall journey satisfaction was accounted for, suggesting that other factors might be present
- further qualitative research was therefore undertaken in May 2003, to try and identify any missing dimensions. Eight focus groups were undertaken, covering leisure, commuter and business travellers and covering both urban, suburban and rural locations. The key conclusion was that for frequent passengers, there were no measures on the following
  - Presence of staff on the station
  - Presence of staff on the train
  - Cleanliness of the outside of the train
  - Cleanliness of the inside of the train

These factors have been incorporated into the questionnaire – the cleanliness questions from Autumn 2003 and the availability of staff from Spring 2004 (these availability questions were originally only asked of regular travellers on a route but this was changed to all respondents in the Spring 2004 survey).

Overall satisfaction with today's journey is also measured. The full list of 31 factors used is as shown overleaf. Multivariate analysis is now undertaken every wave – nationally, by TOC type and by individual TOC – to determine the relative importance of each factor in influencing overall trip satisfaction. The results from this multivariate analysis are shown at Appendix A.

In addition to these measures, the questionnaire monitors many other aspects of passenger journeys, and is shown at Appendix B. At stations in Wales, a Welsh version is offered to respondents and this is shown at Appendix C.

## Full list of 31 factors measured in NPS

### 12 STATION FACTORS:

#### \*Ticket buying facilities

#### \*Provision of information about train times / platforms

The upkeep/ repair of the station buildings/ platforms

#### \*Cleanliness of the station

The facilities and services at the station

The attitudes and helpfulness of the staff

Connections with other forms of public transport

Facilities for car parking

#### **The overall station environment**

\*Your personal security whilst using that station

How request to station staff was handled

\*Availability of staff at the station

### 19 TRAIN FACTORS:

#### \*The frequency of the trains on that route

#### \*Punctuality / reliability (i.e. the train arriving / departing on time)

#### \*The length of time the journey was scheduled to take (speed)

#### \*Connections with other train services

#### \*The value for money for the price of your ticket

\*Cleanliness of the train

#### **Up keep and repair of the train**

\*The provision of information during the journey

The helpfulness and attitude of staff on train

The space for luggage

\*The toilet facilities

#### \*Sufficient room for all the passengers to sit / stand

#### \*The comfort of the seating area

\*The ease of being able to get on and off the train

\*Your personal security whilst on board the train

Availability of staff on the train

\*Cleanliness of the inside of the train

\*Cleanliness of the outside of the train

How well train company dealt with delays

All the dimensions are rated by respondents on five point verbal scales, either a satisfaction scale or a good/poor scale. There is a final option for did not use/no opinion. Those marked with an asterisk in the above list are the significant factors identified from the national multivariate analysis this wave. Those emboldened were identified as key from the initial conjoint analysis.

#### 4. Glossary of terms

Certain terms are used throughout the NPS and these are defined here, for convenience.

**Central London** stations are any of the following:

|                  |                        |               |
|------------------|------------------------|---------------|
| Blackfriars      | Kings Cross            | Paddington    |
| Cannon Street    | Kings Cross Thameslink | St Pancras    |
| Charing Cross    | Liverpool Street       | Victoria      |
| City Thameslink  | London Bridge          | Waterloo      |
| Euston           | Marylebone             | Waterloo East |
| Fenchurch Street | Moorgate               |               |

**Journey purpose** provides a categorisation of passenger journeys. Journeys are defined as Commuter, Business or Leisure, using the codes at Appendix F.

**Peak** journeys for journeys in London and the South East are defined as weekday journeys for which the train terminates (or passes through for Thameslink) at a Central London station before 10:00 or departs from a Central London Station between 16:00 and 19:00

**Shift** is a period during which a fieldworker distributes questionnaires to rail passengers

**TOC** is a Train Operating Company

**TOC type** classifies each TOC into one of three types, currently as follows:

| London & South East      | Long distance       | Regional             |
|--------------------------|---------------------|----------------------|
| c2c                      | First Great Western | Arriva Trains Wales  |
| Chiltern Railways        | GNER                | Merseyrail           |
| South Eastern Trains     | Midland Mainline    | Northern Rail        |
| One                      | Virgin CrossCountry | Central Trains       |
| Silverlink               | Virgin West Coast   | Gatwick Express      |
| Southern                 |                     | Island Line          |
| South West Trains        |                     | First ScotRail       |
| Thameslink               |                     | Wessex               |
| First Great Western Link |                     | TransPennine Express |
| WAGN                     |                     |                      |

## 5. Deliverables

A wide range of reports are produced from the NPS data each wave. The key reports are defined below:

| Report                 | Produced for   |
|------------------------|--|
| TOC Reports            | Produced for each TOC, virtual TOC and PTE area and sent both electronically and hard copy   |
| TOC tables             | Data tables produced for each TOC and sent electronically  |
| TOC demographic Report | A short electronic report which profiles passengers of the TOC   |
| Consultees Report      | Hard copy produced for all TOCs and a range of consultees  |
| Summary                | A report providing trend data for each TOC by wave which is used to generate the Passenger Focus NPS report                        |
| Large Stations         | Report providing data for stations with average sample sizes above 100 per wave. Data from this is now provided in each TOC Report |
| BTP                    | An SPSS file produced for BTP covering the questions on security and the BTP (Autumn waves only)                                   |
| Best in class          | A report which determines the best result for any TOC in each TOC type, which is used to set benchmarks                            |
| Silverlink split       | A Report providing data for both County and metro services   |
| Multivariate analysis  | Key drivers nationally, for each TOC type and each TOC   |
| Verbatim comments      | Picture files of open ended responses are provided to each TOC electronically  |
| Field Report           | A document detailing the field operation   |
| Overview Report        | This report, outlining the key elements of NPS   |

All reports are supplied electronically to Passenger Focus on a CD at the end of each wave. The TOC Reports and Consultees Report are also distributed in hard copy format to a distribution list mandated by Passenger Focus.



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