# Examining the links between Train Performance Measures and Customer Satisfaction

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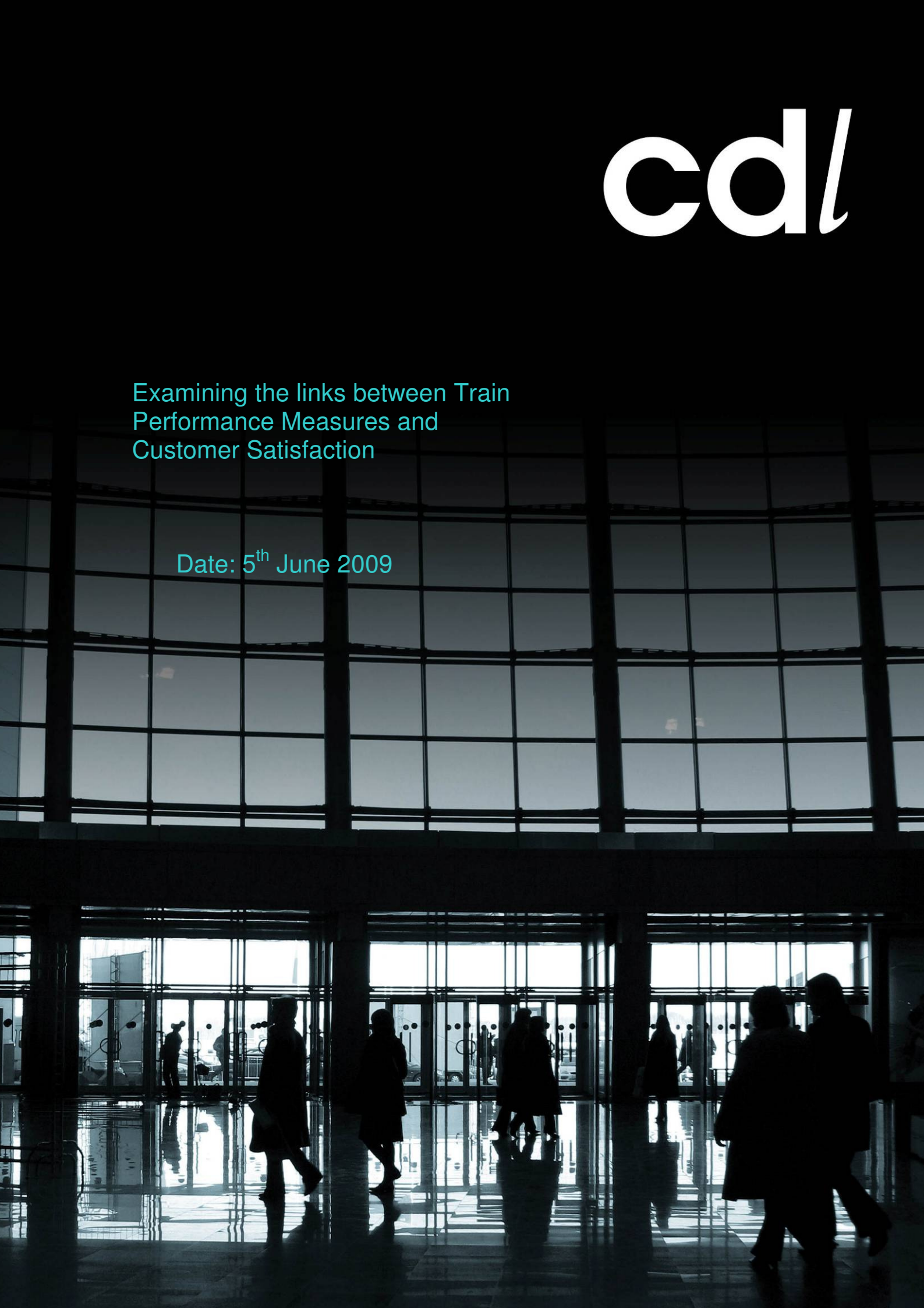

# Document Control Sheet

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**Examining the links between Train Performance Measures and Customer Satisfaction**

## Executive Summary

This study investigated the nature of the relationship between train performance and the National Passenger Survey (NPS) customer satisfaction by examining arrivals at and departures from London Liverpool Street, over the past three and a half years, particularly on weekdays.

This report firstly considered the NPS survey sample, and analyses some of the results. It then examined NXEA performance measured by the train delay, before then considering the spread of passenger delays, taking into account the different loadings and passenger types carried on different services. Finally the report examined how our derived values for passenger delay may correlate with levels of passenger satisfaction.

Our findings are

More Generally:

- Overall satisfaction with train services is dominated by satisfaction with punctuality.
- Passenger lateness differs from measures of train lateness, due the effect of cancellations and to difference between lateness of a train at intermediate stations and the lateness of a train at its final destination.
- There is a strong (and largely linear) relationship between the level of satisfaction, and the level of delay experienced by the passenger on the day of travel.
- Journey purpose is an important consideration in the level of satisfaction, with commuters less satisfied than leisure passengers. This appears to be related to the frequency of travel, with commuters taking their experience over the previous three months into consideration when recording their level of satisfaction.
- Train services with a high proportion of commuters have lower levels of satisfaction than those with a high proportion of business and leisure travellers, even at the same level of performance or delay.
- Leisure travellers appear to be less sensitive to small levels of delay.
- Comparisons of satisfaction with punctuality between different services are best undertaken by considering the same journey purpose only.
- Journey distance has little or no bearing on the level of satisfaction for a given level of lateness.
- Levels of crowding do not have a material impact on the level of satisfaction expressed for punctuality
- The current process used in the weighting of NPS reflects how passenger volumes vary by station. When measuring the impact of performance the weightings by service group or time of day (particularly in the evening) may be more appropriate. Therefore weightings applied to NPS responses should be reviewed.

For NXEA services in particular:

- West Anglia route services have improved. This improvement coincides with changes at the December 2005 and December 2006 timetable changes.
- Punctuality is worse in the peak periods, particularly in the evening peak across all Great Eastern (GE) route services.

- Average *passenger* lateness for evening peak services is worse than that indicted by *train* lateness, because most people disembark before the terminating station.
- GE route services show a strong variation by season, with autumn services consistently a number of percentage points worse than the best results achieved during the summer.
- GE Mainline services (London<>Norwich) are by far the worst performing NXEA services, when measured by average passenger lateness.
- Trains terminating at Colchester during the peak appear to have insufficient timing allowance when compared with other services.

# 1 Introduction

## 1.1 Passenger Satisfaction & Train Performance

Evidence from a wide range of research, including that of Passenger Focus, has highlighted that punctuality and reliability of train services is one of the key determinants of each Train Operating Company's (TOC) NPS customer satisfaction score. However, the exact nature of the linkage between changes in actual measured performance and customer satisfaction is not fully understood.

This difficulty is illustrated by the recent experience at National Express East Anglia (NXEA), where despite significant performance improvements (as measured by the Public Performance Measure or PPM), there has been little corresponding change in customer satisfaction results. But there may be many possible reasons for this, such as time lags between improved performance and changes in public perception, differences in the distribution of delays that aren't reflected in average performance measures, and the impact of cancellations.

This study uses NXEA performance data and NPS customer satisfaction data, to build an understanding of the causal relationship between measured train performance and NPS customer satisfaction results, and thereby help identify what steps can be taken to minimise inconvenience to passengers and enhance passenger satisfaction.

## 1.2 Objectives

This study will investigate the nature of the relationship between train performance and NPS customer satisfaction by examining arrivals at and departures from London Liverpool Street, over the past three and a half years, particularly on weekdays.

Specifically, our study aims to:

- Investigate the distribution of delays through examining specific train delays and correlating them with passenger satisfaction.
- Analyse any differences between measures of train delay and measures of passenger delays.
- Examine the impact of different passenger types and routes.
- Take account of the impact of cancellations on passengers.
- Consider time lags between performance improvements and customer satisfaction impacts.
- Examine the relationship between crowding and customer satisfaction of train performance

## 1.3 Report Structure

This report firstly considers the NPS survey sample, and analyses some of the results.

We then examine NXEA performance measured by the train delay, before then considering the spread of passenger delays, taking into account the different loadings and passenger types carried on different services.

Finally we examine how our derived values for passenger delay may correlate with levels of passenger satisfaction.

## 1.4 Data

### *1.4.1 NPS Records*

Passenger Focus conducts an NPS every 6 months in spring and autumn. When compared with train performance data, there are relatively few NPS records, and to obtain a sufficiently large sample, our analysis uses NXEA's NPS data from the last 7 surveys or 'waves', covering a period of $3^1/_2$ years. The sample size for NXEA is based upon responses from around 1,600 per wave until autumn 2007, where there is an increase to just over 2,000 per wave and gives a total potential of 13,162 NPS records.

Each NPS record provides the date the respondent was surveyed, the journey they undertook, and the train they caught. Along with customer satisfaction ratings, the survey also records some personal details such as the age, gender, employment, and broad journey purpose category.

The choice of $3^1/_2$ years was also influenced by timetable changes on NXEA. The Great Eastern group of services were completely re-cast in December 2004, with West Anglia following one year later. We have therefore judged that in basing our analysis on 7 key data points over $3^1/_2$ years will provide a good chance of identifying correlations with reasonable sample sizes and variations, and yet maintain a manageable dataset without major timetable upheavals on most routes.

### *1.4.2 Train Performance Records*

To match the available data from the NPS surveys, NXEA provided details of train punctuality for each of NXEA's scheduled trains arriving or departing London Liverpool Street over the corresponding $3^1/_2$ year period for which NPS records have been collated (between 01/05/05 and 06/12/08), giving a total of 1.5m train records. Each record details the date, origin, destination and lateness at the final destination (or cancellation) for each train.

In considering services from London, NXEA have also provided punctuality details for trains at a selection of stations en route to allow us to compare the lateness of services at intermediate stations with the lateness at the final destination.

Throughout this analysis, trains arriving early are treated as arriving on time (i.e. no benefit is assumed for trains arriving before their scheduled time).

### *1.4.3 Passenger Loads and Capacity for each Train*

Passenger loads were obtained from a software package called 'MOIRA'. MOIRA is a standard UK rail industry timetable evaluation tool which models how customers choose between train services based on journey time, service frequency and ticket sales. MOIRA Loads Data provided an appropriate means of estimating the number of passengers on each weekday NXEA service which can then be used to weight delay by train service. Following the major timetable changes in December 2004 (GE) and December 2005 (WA) there have only been minor changes. Where this has occurred, each service has been linked to May 2008 service to provide a common level of demand throughout the study period.

A default train capacity was assumed based upon the service group of each train service, except for the morning and evening peak periods where the assumed capacity for each peak service was obtained from NXEA's 2007 Annual Peak Passenger Census (often referred to as the 'Green Book').

### *1.4.4 Service Groups*

Train services across Britain's national rail network are segregated into service codes and groups. Each train is allocated to a train service code, and train service codes may then be aggregated into service groups. These service groups reflect some degree of commonality in the origin, destination, calling pattern and timing of each service, and therefore the make-up of passengers using the service. Service groups used for this study were:

- GE Inner: Ilford, Gidea Park and Shenfield
- GE Southend: Southend Victoria and Southminster
- GE Outer: Chelmsford, Braintree, Colchester, Clacton, Ipswich & Harwich
- GE Mainline: Norwich and direct services from Lowestoft/Bury St Edmunds
- WA Inner: Services from Chingford, Enfield Town, Cheshunt and Hertford
- WA Outer: Bishops Stortford, Stansted Airport, Cambridge, Ely, Kings Lynn
- WA Stansted: Stansted Express

A further aggregation at 'Route' level can be created for Great Eastern (GE) services and West Anglia (WA) services.

# 2 NPS Sample

## 2.1 Introduction

In order to obtain a statistically robust assessment of passenger satisfaction, the NPS survey is managed so as to obtain results from across the whole NXEA area from different sizes of station and at different times of day, and day of week so that the views of a mix of commuters, business and leisure travellers are represented within the published results. In addition, to reduce variations due to sampling error, the number of respondents recruited at smaller stations is proportionately increased above that which the station would otherwise justify.

## 2.2 Weighting of Survey Results

In order that the results correctly represent the views of all passengers travelling, the results are weighted to reflect the total number of passengers travelling by weekday/weekend, overall journey purpose and station category (which is a grouping by number of passengers using the station).

To maximise the chance of deducing a relationship between customer satisfaction and performance it is important that the basis of weighting reflects the passenger volumes being used in the analysis, and we therefore undertook a comparison between the proportions of passengers derived through the NPS weighting process and the passenger volumes obtained through analysing MOIRA data. Journey purpose values were derived by taking passenger volume on each train by ticket type derived from MOIRA, and allocating the proportion of each ticket type to each journey purpose category using the percentages published by the DfT's National Rail Travel Survey.

The results of this comparison showed a good fit against day of week, route (GE vs WA) and journey purpose (Business, Commuter, Leisure). However, this analysis suggested that the NPS weightings did not closely match against some Service Group volumes and time of travel. In particular, the views of GE Inner suburban passengers are under-represented within the sample, whilst GE Outer and GE Mainline passengers are over-represented, whilst passengers travelling at the main peak times to or from London are under-represented, particularly those travelling from London during the evening peak (See APPENDIX A for a summary of comparison).

Both Service Group and time of travel to and from London will be key areas for examination in this study, and so the weightings used within the published NPS results were amended to reflect the passenger volumes derived from MOIRA. The effect of using this set of revised weightings was to marginally reduce the satisfaction score for performance on NXEA as a whole.

| % Satisfied | WAVE 13 | WAVE 14 | WAVE 15 | WAVE 16 | WAVE 17 | WAVE 18 | WAVE 19 |
|---|---|---|---|---|---|---|---|
| Published NPS | 74% | 70% | 71% | 71% | 75% | 74% | 77% |
| Adjusted Weightings | 72% | 68% | 70% | 68% | 74% | 72% | 75% |

## 2.3 Data for Depth Analysis of London Flows

There are 13,162 respondents over the 7 waves analysed. However, only 7,066 relate to flows to or from London on weekdays, which is at the core of this study.

| | Passengers Surveyed | Weighting (adjusted) | Av. Weight per Respondent |
|---|---|---|---|
| Weekdays | | | |
| To London | 3293 | 217,764 | 66 |
| From London | 3773 | 188,466 | 50 |
| Other | 4333 | 248,504 | 57 |
| | | | |
| Weekends | 1763 | 87,752 | 50 |
| | | | |
| Total | 13162 | | |

This is a lower number than had been originally hoped for and has placed more emphasis on analysing data across all the waves combined rather than individual waves or Service Groups.

However, the major timetable change on West Anglia has meant that for much of the more advanced analysis (which requires a consistent basis for arrival time in London, train loads, average passenger journey time and crowding), it has been possible to only use the latest five waves (wave 15-19). This gives a total of only 5,000 survey results, 3,000 of which have been taken in the peak period.

## 2.4 Survey Dates and Data Disaggregation

The ‘Spring’ NPS survey is carried out in January, February and March, whilst the ‘Autumn’ survey is carried out in September, October and November. These are not

evenly spaced through the year and are undertaken at times when performance is generally worse than at other times of the year (e.g. leaf-fall or snow).

Furthermore, once the remaining results are segregated into railway periods (there are 13 railway periods in each year) great care is required in using the sample within each period (approx 150 to 600 respondents) which may then be further split into journey purpose, routes, service groups, and different levels of satisfaction. This is limited set of data is even further limited when we consider that around half of respondents (48%) arrived 'right-time or early' whilst a further quarter (27%) arrived within 4 minutes of their scheduled time. This leaves only a small sample for longer levels of delay (7% with 15 minutes or more).

| | 1.Satisfied(Net) | 2.Neither, Nor | 3.Dissatisfied(Net) | Missing | Grand Total |
|---|---|---|---|---|---|
| 1. RT or Early | 1827 | 237 | 213 | 107 | 2384 |
| 2. 1-4mins Late | 1005 | 144 | 145 | 68 | 1362 |
| 3. 5-14mins Late | 559 | 94 | 234 | 41 | 928 |
| 4.15-29mins Late | 65 | 16 | 92 | 10 | 183 |
| 5.30-59mins Late | 46 | 5 | 51 | 3 | 105 |
| 6. 60+mins Late | 4 | | 4 | 1 | 9 |
| 7. Cancelled/Other | 14 | 3 | 24 | 1 | 42 |
| **Grand Total** | **3520** | **499** | **763** | **231** | **5013** |

We therefore have found that having decided to split the sample by journey purpose (see below) that most analysis can only be undertaken at route and Net Satisfied/Dissatisfied levels.

### 2.5 Other Related Flows

A further observation is that for the seven waves surveyed, weekday journeys to Stratford totals 534, whilst that of Tottenham Hale and Seven Sisters totals 246 compared with 2,364 for London Liverpool Street. In the reverse direction the numbers are 349, 316 and 2,760 respectively.

These are key interchange points for some London commuters. However the lateness at these intermediate points has not been recorded and whilst it would be reasonable that these passengers could be categorised as 'London bound' they have been excluded from the depth analysis.

## 3 NPS Results

### 3.1 Use of NPS Data

All NPS results were analysed to identify where there are differences (or similarities) between different groups or categorisations of passengers in their opinions of train performance. This part of the process is important in identifying key drivers or differentiators which may then be applied when seeking correlations. We have used the revised weightings discussed above within this part of the analysis, since service group and time of day are likely to be key issues when considering train performance.

### 3.2 Overall Satisfaction vs Satisfaction with Punctuality

As part of each NPS wave, a Multivariate analysis is undertaken to determine which factors (punctuality, crowding, etc) are most important in determining overall customer satisfaction.

The analysis undertaken is a stepwise regression which identifies the factors which correlate most highly with overall satisfaction. If, for example, those satisfied with punctuality are much more likely to be satisfied overall, then punctuality is likely to be a key driver of overall satisfaction.

The results show that generally customers are most likely to be satisfied with their journey if they are satisfied with punctuality/reliability. This is the key driver for journey satisfaction. Conversely, customers are most likely to be dissatisfied with their journey if they are dissatisfied with how the train company dealt with any delays. Passenger Focus has found that whilst there are differences between TOCs these two key conclusions apply to most train companies.

| Multivariate Analysis Satisfaction Results for NXEA | Aut05 | Spr06 | Aut06 | Spr07 | Aut07 | Spr08 | Aut08 | Average |
|---|---|---|---|---|---|---|---|---|
| PUNCTUALITY/ RELIABILITY (I.E. THE TRAIN ARRIVING/ DEPARTING O | 41% | 43% | 52% | 52% | 45% | 56% | 50% | 48% |
| THE LENGTH OF TIME THE JOURNEY WAS SCHEDULED TO TAKE (SPEED) | 9% | 12% | 9% | 6% | 11% | 8% | 5% | 9% |
| THE FREQUENCY OF THE TRAINS ON THAT ROUTE | 8% | 10% | 7% | 5% | 5% | 10% | 8% | 8% |
| SUFFICIENT ROOM FOR ALL THE PASSENGERS TO SIT/STAND | | 3% | | 5% | 4% | | 11% | 6% |
| YOUR PERSONAL SECURITY WHILST USING THAT STATION | 12% | | 4% | 8% | 6% | 6% | 2% | 6% |
| Other (5% or less per Factor) | 29% | 32% | 29% | 24% | 30% | 20% | 24% | 24% |
| TOTAL VARIANCE | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

We therefore expect to see a strong relationship between Overall Satisfaction and satisfaction with Punctuality. The tables below show how overall satisfaction differs from punctuality satisfaction to/from London.

| To London | Punctuality Satisfaction | Overall Satisfaction |
|---|---|---|
| 1.Satisfied (Net) | 73% | 71% |
| 2.Neither, Nor | 11% | 17% |
| 3.Dissatisfied (Net) | 16% | 12% |
| Grand Total | 100% | 100% |

| From London | Punctuality Satisfaction | Overall Satisfaction |
|---|---|---|
| 1.Satisfied (Net) | 74% | 75% |
| 2.Neither, Nor | 11% | 16% |
| 3.Dissatisfied (Net) | 15% | 10% |
| Grand Total | 100% | 100% |

At high level the Overall Satisfaction score for the percentage satisfied closely aligns with the punctuality satisfaction score. The swing in satisfaction scores occurs between the percentage dissatisfied and the percentage with no opinion (Neither, Nor). A similar comparison between overall satisfaction and punctuality satisfaction scores can be seen at more detailed level by Service Group or journey purpose (See APPENDIX B).

For our detailed analysis we have therefore used the value for satisfaction with Punctuality, since this relates directly to the rail measure being used and is a very strong indicator of Overall Satisfaction.

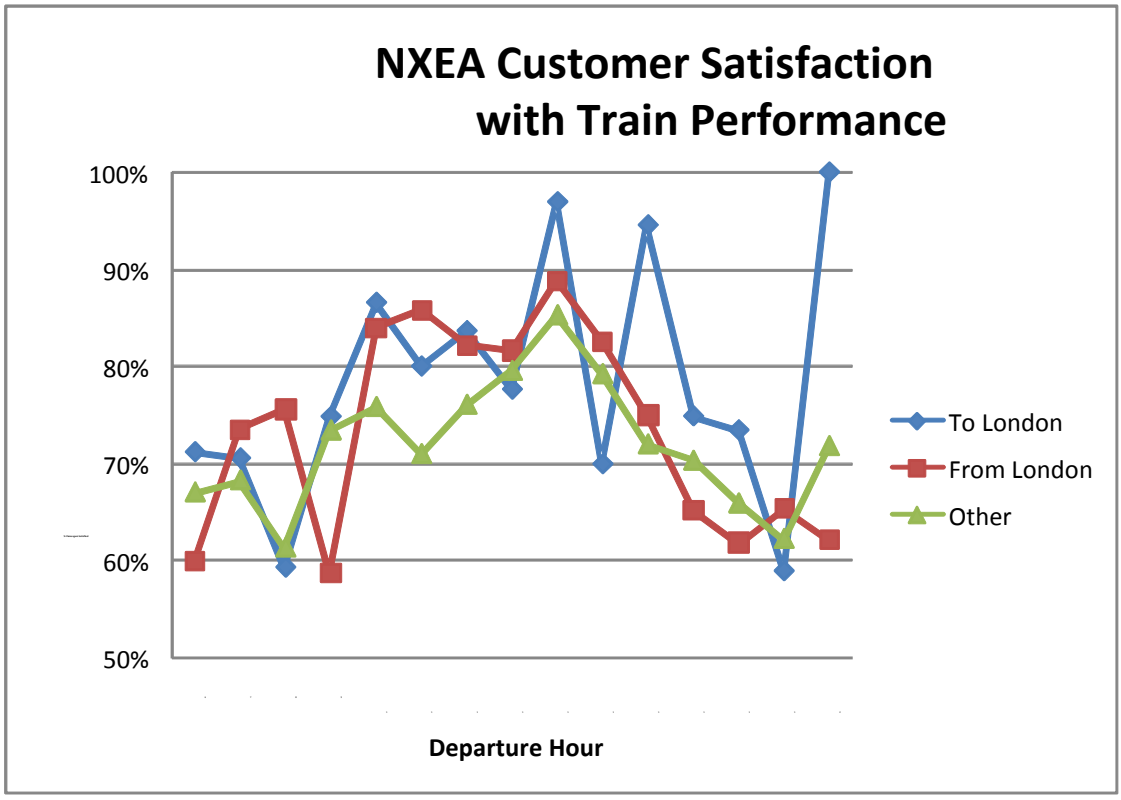
## 3.3 Passenger Satisfaction Results

### *3.3.1 Satisfaction with Punctuality*

Satisfaction with punctuality for NXEA has averaged 71% over the past $3^{1}/_{2}$ years.

Analysis of satisfaction results (see APPENDIX C) shows that the lowest levels of satisfaction are recorded by commuters, with only an average of 66% satisfied, compared with 85% of leisure travellers. Results that show lower satisfaction for those travelling on weekdays, those in full time employment, those aged between 26 and 44 all of which reflect key attributes of commuters.

Furthermore, NPS results show that satisfaction is significantly lower for those travelling during the weekday peak periods.



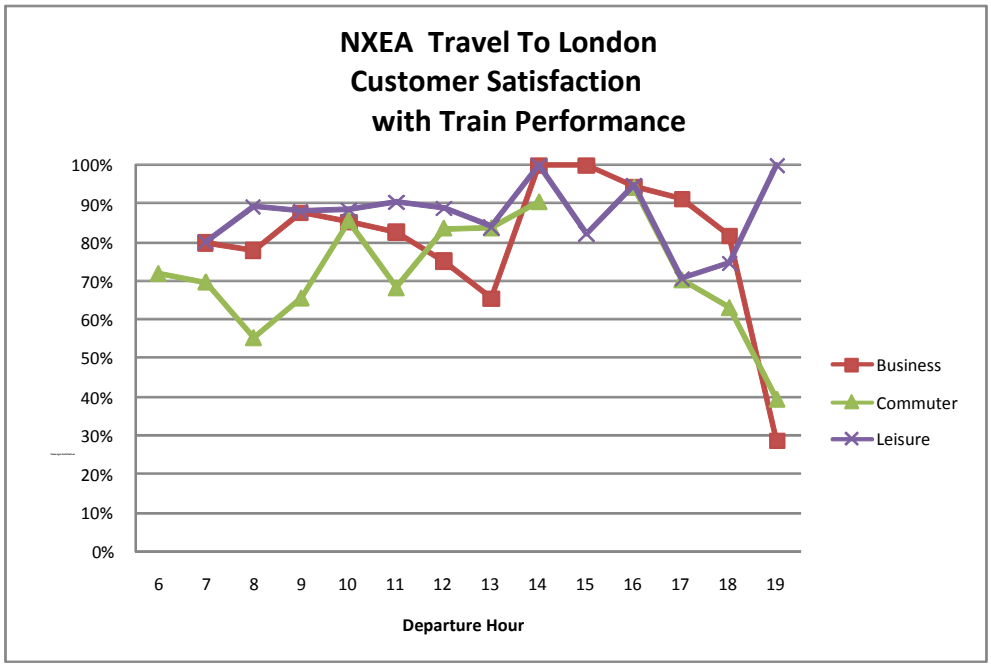

Weekday travel accounts for 90% of demand, and travel to and from London Liverpool Street accounts for 54% of all weekday journeys on NXEA (c92,000), with Stratford the next largest station (15% of passenger journeys) and a further 7% alighting at Tottenham Hale or Seven Sisters for interchange onto the underground.

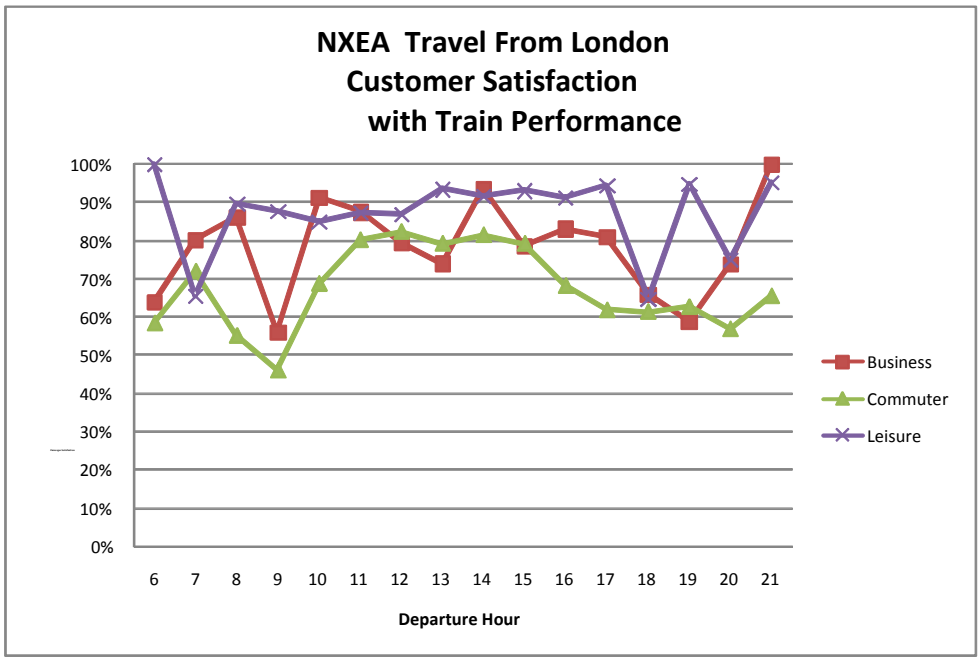
Satisfaction levels for non-London 'Other' travel (including those travelling to Stratford, Tottenham Hale and Seven Sisters) is not significantly different to those travelling to/from London, and therefore differences are unlikely to unduly influence survey results.

### *3.3.2 Satisfaction To/From London by Journey Purpose*

Differences in satisfaction by time of day can be seen if we consider direction of travel and journey purpose.

Overall, for each journey purpose, there is no difference between those being surveyed when travelling to London and those travelling away from London, although differences do exist when we consider the time of day in each direction.



Given that for passengers travelling in the same direction at the same time, we would expect passengers for each journey purpose to experience the same level of delay, we might expect the same levels of satisfaction for each passenger grouping, and yet there appears to be a materially lower score given by commuters.

Furthermore, the evening shows a sustained low score over the whole 5-6 hours, whereas in the morning, whilst some scores are lower, the particularly poor values are focused upon the relatively short period of time in the high peak.

### *3.3.3 Satisfaction by Route & Service Group (To/From London)*

The above analysis suggests that comparison of customer satisfaction between routes and service groups may need to take into account the different mix of journey purpose on different service groups, since different types of passenger appear to react differently to the same level of delay. This primarily affects Stansted Express and GE Mainline services (to/from Norwich) where the proportion of commuters is much lower than that of other services (17% and 30% compared with an average across all services of 80%). Using NPS survey data we can see that on other services, the proportion of commuters varies from 90% on GE Inner services to 70% on WA Outer services.

| Journey Purpose by Service Group To/from London | Business | Commute | Leisure | Grand Total |
|---|---|---|---|---|
| 1. GE Inner | 6% | 90% | 4% | 100% |
| 2. GE Southend/S'min | 8% | 83% | 9% | 100% |
| 3. GE Mainline | 48% | 30% | 22% | 100% |
| 4. GE Outer | 16% | 76% | 8% | 100% |
| 5. WA Inner | 7% | 87% | 6% | 100% |
| 6. WA Outer | 23% | 70% | 7% | 100% |
| 7. WA Stansted | 57% | 17% | 26% | 100% |
| Grand Total | 13% | 80% | 7% | 100% |

Overall satisfaction by Service Group for journeys to/from London shows the highest levels of satisfaction on WA Stansted (Stansted Express), with other Service Groups generally between 67% and 73%, except GE Outers, which are lower value at 63%.

| Satisfaction by Service Group | 1.Satisfied(Net) | 2.Neither, Nor | 3.Dissatisfied(Net) | Grand Total |
|---|---|---|---|---|
| 1. GE Inner | 67% | 12% | 22% | 100% |
| 2. GE Southend/S'min | 73% | 17% | 11% | 100% |
| 3. GE Mainline | 69% | 11% | 20% | 100% |
| 4. GE Outer | 63% | 13% | 23% | 100% |
| 5. WA Inner | 71% | 12% | 18% | 100% |
| 6. WA Outer | 70% | 13% | 17% | 100% |
| 7. WA Stansted | 81% | 10% | 9% | 100% |
| Grand Total | 69% | 12% | 18% | 100% |

However, if we look at commuters only, and thereby remove any bias associated with the different mix of journey purpose, the picture changes, with lower values in total (commuters scoring performance lower than those travelling on other journey purposes), and much lower values for GE Mainline service which are now on a par with GE Outers.

| Commuter Satisfaction by Service Group | 1.Satisfied(Net) | 2.Neither, Nor | 3.Dissatisfied(Net) | Grand Total |
|---|---|---|---|---|
| 1. GE Inner | 64% | 12% | 24% | 100% |
| 2. GE Southend/S'min | 70% | 18% | 13% | 100% |
| 3. GE Mainline | 57% | 14% | 29% | 100% |
| 4. GE Outer | 59% | 14% | 27% | 100% |
| 5. WA Inner | 67% | 13% | 20% | 100% |
| 6. WA Outer | 61% | 16% | 23% | 100% |
| 7. WA Stansted | 75% | 13% | 12% | 100% |
| Grand Total | 65% | 14% | 22% | 100% |

Similarly if we look at leisure travellers, we can see much more similarity between the service groups, although the lowest score is recorded by GE Inner services.

| Leisure Satisfaction by Service Group | 1.Satisfied(Net) | 2.Neither, Nor | 3.Dissatisfied(Net) | Grand Total |
|---|---|---|---|---|
| 1. GE Inner | 82% | 8% | 9% | 100% |
| 2. GE Southend/S'min | 97% | 1% | 2% | 100% |
| 3. GE Mainline | 85% | 6% | 9% | 100% |
| 4. GE Outer | 87% | 5% | 8% | 100% |
| 5. WA Inner | 91% | 2% | 7% | 100% |
| 6. WA Outer | 85% | 7% | 8% | 100% |
| 7. WA Stansted | 90% | 5% | 4% | 100% |
| **Grand Total** | **87%** | **5%** | **7%** | **100%** |

This reinforces the need to take into account journey purpose when seeking to understand the drivers of satisfaction and any correlations.

### *3.3.4 Change in Levels of Satisfaction Over Time*

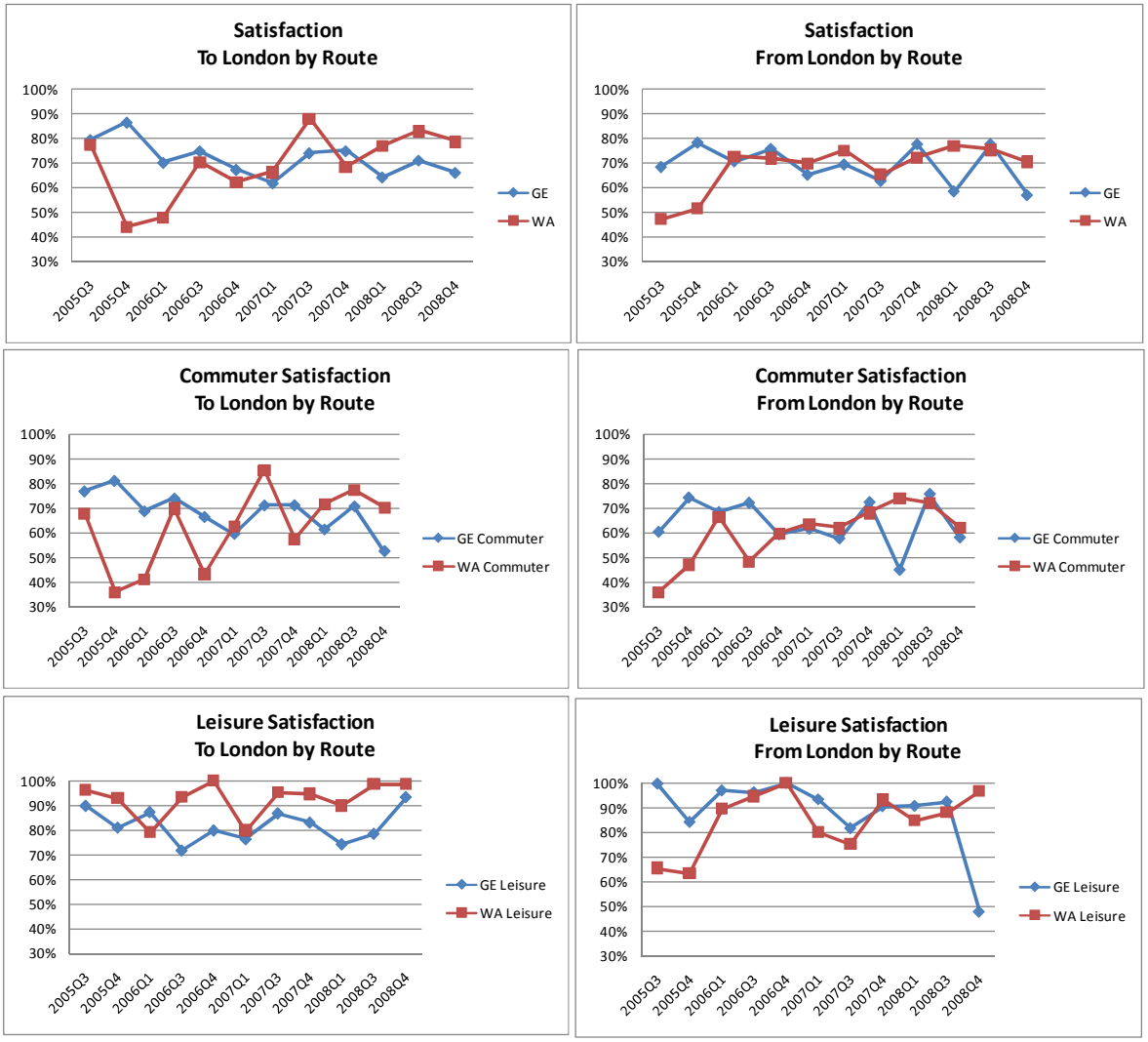
Total satisfaction with punctuality for NXEA has averaged 71% over the past $3^1/_2$ years, varying between a low of 64% (at the end of 2006), and a high of 74% the third quarter of 2008).

| To London | 2005Q3 | 2005Q4 | 2006Q1 | 2006Q3 | 2006Q4 | 2007Q1 | 2007Q3 | 2007Q4 | 2008Q1 | 2008Q3 | 2008Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 74% | 65% | 68% | 72% | 64% | 68% | 76% | 71% | 72% | 79% | 69% |
| GE | 79% | 86% | 70% | 75% | 67% | 62% | 74% | 75% | 64% | 71% | 66% |
| WA | 77% | 44% | 48% | 70% | 62% | 66% | 88% | 68% | 77% | 83% | 79% |
| GE Commuter | 77% | 81% | 69% | 74% | 66% | 59% | 71% | 71% | 61% | 71% | 52% |
| WA Commuter | 68% | 36% | 41% | 70% | 43% | 63% | 86% | 57% | 72% | 78% | 70% |
| GE Leisure | 90% | 81% | 87% | 72% | 80% | 76% | 87% | 83% | 74% | 79% | 93% |
| WA Leisure | 96% | 93% | 79% | 93% | 100% | 80% | 95% | 95% | 90% | 99% | 99% |

| From London | 2005Q3 | 2005Q4 | 2006Q1 | 2006Q3 | 2006Q4 | 2007Q1 | 2007Q3 | 2007Q4 | 2008Q1 | 2008Q3 | 2008Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GE | 68% | 78% | 71% | 76% | 65% | 69% | 63% | 78% | 58% | 78% | 57% |
| WA | 47% | 51% | 73% | 72% | 70% | 75% | 65% | 72% | 77% | 75% | 70% |
| GE Commuter | 60% | 74% | 68% | 72% | 59% | 62% | 58% | 72% | 45% | 76% | 58% |
| WA Commuter | 36% | 47% | 66% | 48% | 60% | 63% | 62% | 68% | 74% | 72% | 62% |
| GE Leisure | 100% | 84% | 97% | 96% | 100% | 93% | 82% | 91% | 91% | 92% | 48% |
| WA Leisure | 65% | 63% | 90% | 95% | 100% | 80% | 75% | 93% | 85% | 88% | 97% |

These results show how satisfaction has particularly improved for West Anglia commuters. It is also worth noting that this improvement coincides with timetable change dates in December 2005 and December 2006.

Conversely, satisfaction on GE services has, if anything, fallen. In particular there appears to have been a gradual fall in commuter satisfaction for those travelling to London.




### *3.3.5 Degrees of Satisfaction/Dissatisfaction*

The NPS results offer the opportunity for respondents to express whether they are very satisfied or very dissatisfied. This accentuates the difference already observed between commuters and leisure travellers, with 52% of leisure travellers very satisfied and only 3% very dissatisfied, compared with 21% and 10% for commuters respectively.

| | Business | Commuter | Leisure | Grand Total |
|---|---|---|---|---|
| 1.Very Satisfied | 42% | 21% | 52% | 27% |
| 2.Fairly Satisfied | 38% | 44% | 35% | 42% |
| 3.Neither, Nor | 10% | 14% | 5% | 12% |
| 4.Fairly Dissatisfied | 6% | 12% | 4% | 10% |
| 5.Very Dissatisfied | 4% | 10% | 3% | 8% |
| **Grand Total** | **100%** | **100%** | **100%** | **100%** |

# 4 NXEA Performance

Having examined how passenger satisfaction has varied, we now need to examine how NXEA performance has varied, and whether this reflects observations made of the customer satisfaction data (i.e. how directly linked are they?).

This analysis will provide an understanding of how performance has varied over time, by route, by direction and time of day. Where differences and changes in customer satisfaction reflect the performance measured, we would expect to be able to find a correlation between the two observations. Conversely, where changes in satisfaction is not reflected in the measured performance we will need to identify why this has occurred and whether the performance measure being used is the most appropriate to reflect passenger satisfaction.

## 4.1 Overview of Performance Results

Over the $3^1/_2$ years being considered by this study the number of trains arriving within 5 minutes of scheduled time (RT5) has averaged 87%, with 90% having been achieved in two quarters (both in the summer months of Quarter 3).

For NXEA, RT5 is a very close measure to PPM, since PPM on most services is the measure of scheduled services arriving within 5 minutes of their advertised time. However, in line with historic practice, and in common with other longer-distance services across National Rail, some NXEA services between London and Norwich, Lowestoft and Peterborough via Ipswich are measured to a standard of 10 minutes.

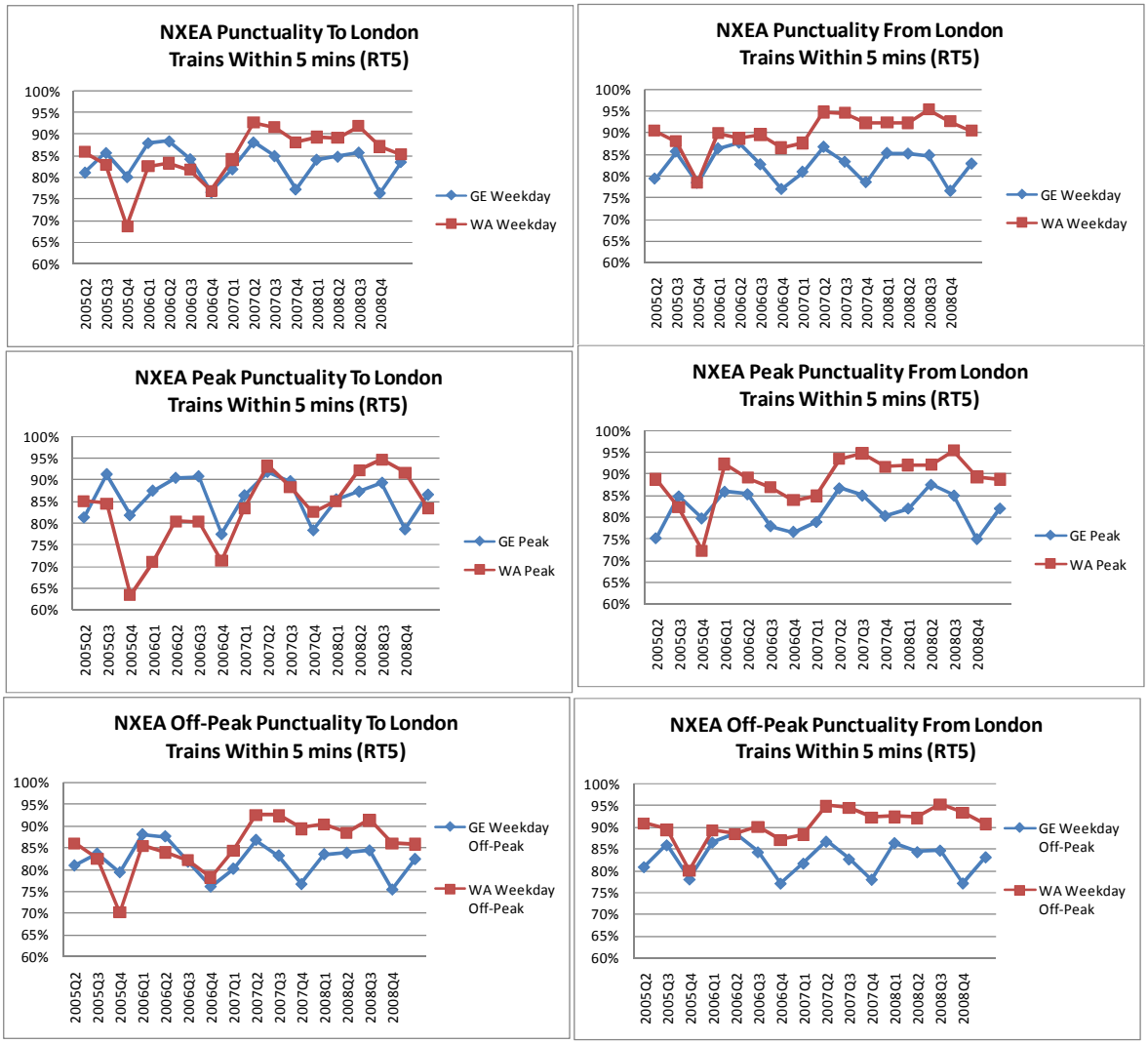
Using the RT5 measure, weekend performance is consistently better than weekdays (+6%).

| RT5 | 2005 Q3 | 2005 Q4 | 2006 Q1 | 2006 Q2 | 2006 Q3 | 2006 Q4 | 2007 Q1 | 2007 Q2 | 2007 Q3 | 2007 Q4 | 2008 Q1 | 2008 Q2 | 2008 Q3 | 2008 Q4 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 86% | 78% | 88% | 88% | 85% | 80% | 85% | 91% | 90% | 85% | 89% | 89% | 90% | 84% | 87% |
| Weekday | 86% | 77% | 87% | 87% | 84% | 79% | 84% | 90% | 89% | 84% | 88% | 88% | 89% | 83% | 85% |
| Weekend | 88% | 83% | 93% | 91% | 89% | 85% | 93% | 94% | 93% | 90% | 94% | 95% | 93% | 90% | 91% |
| GE Weekday | 86% | 79% | 87% | 88% | 83% | 77% | 81% | 87% | 84% | 78% | 85% | 85% | 85% | 76% | 83% |
| WA Weekday | 85% | 74% | 86% | 86% | 86% | 82% | 86% | 94% | 93% | 90% | 91% | 91% | 94% | 90% | 88% |

Over the period being studied the number of trains arriving within 5 minutes of their advertised time has generally improved.

However, this improvement in performance has not been evenly distributed across the routes. Virtually all the improvement has been driven by changes on the West Anglia route, with performance on GE services remaining broadly static.

The graphs below show how performance on the West Anglia routes exhibits a step change at the end of 2005 and again at the end of 2006. These coincide with timetable changes, with the major service pattern changes occurring in December 2005 and further refinements made one-year later. The improvement on the West Anglia route, and the more static results for the Great Eastern are broadly reflected in the NPS satisfaction scores described above.

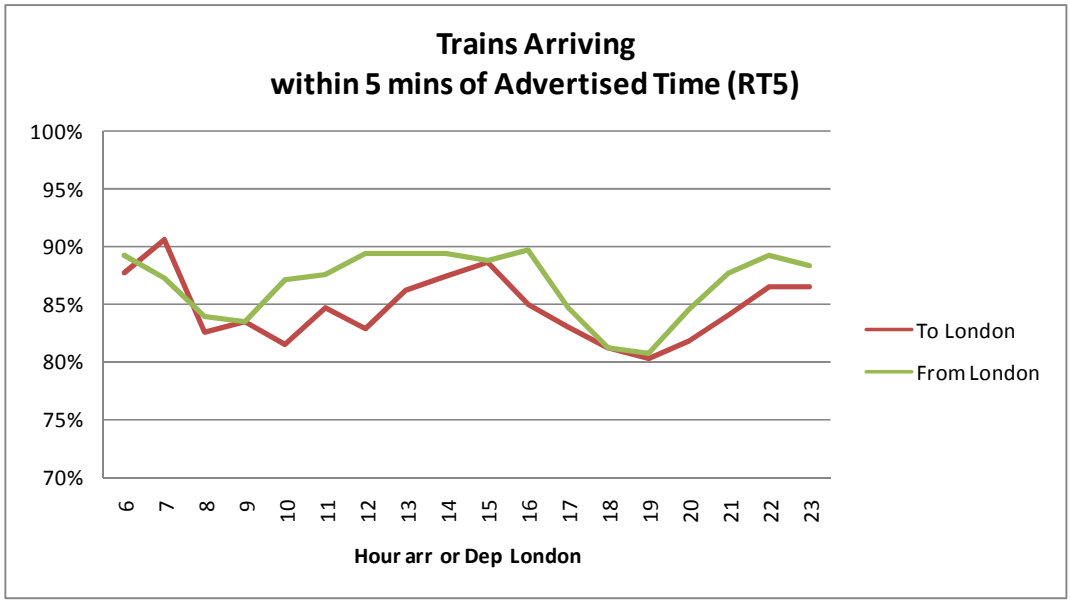



These results also show a distinctive seasonality, which is particularly pronounced on the Great Eastern route, where Quarter 4 is consistently a number of percentage points worse than the best results in Quarter 2.

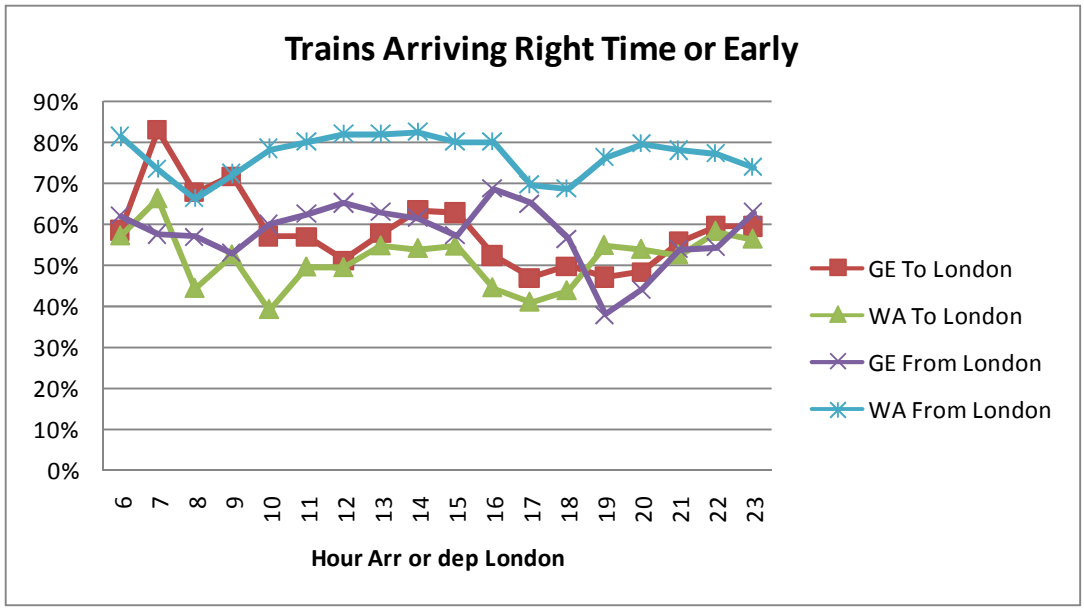
NPS scores do show some degree of seasonality, but NPS surveys are not carried out evenly throughout the year, as there are no surveys carried out in the second quarter of the year (when GE performance is best). That said, provided the lower scores at certain times of year is reflective of the poorer performance experienced during the seasonal dips in performance, this should not in itself, affect the ability to find and identify correlations. However, the smaller number of respondents during certain periods of time may have a bearing on the sample sizes and the level of disaggregation being used.

## 4.2 Performance by Time of day

The proportion of trains arriving within 5 minutes of the scheduled time is worse during the peak periods than during off-peak times. This too is reflected in the customer satisfaction scores.




Looking at those trains that arrive at their scheduled time and by route, we can see that services *from* London on the West Anglia route perform better than services *to* London and all services on the Great Eastern route. This difference has not been explicitly seen within the NPS data.



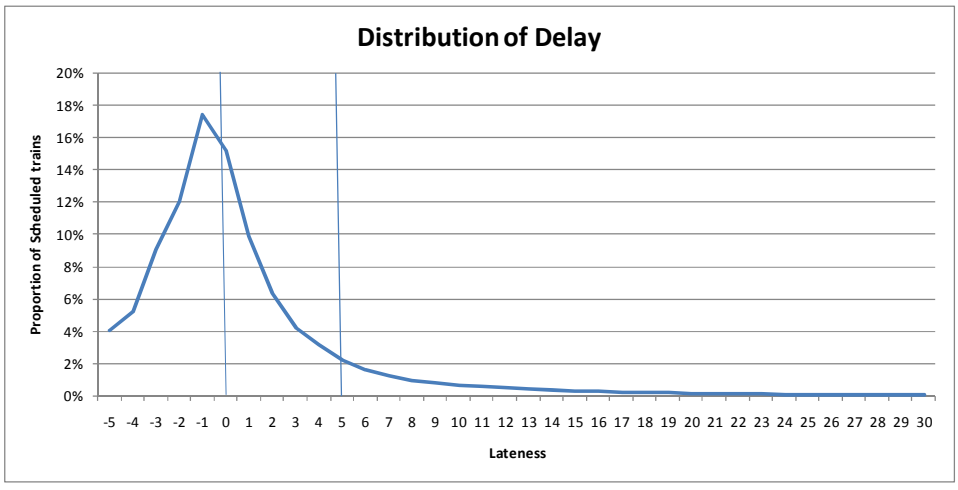

## 4.3 Distribution of Delay

A different measure of delay may be the level of delay experienced for each train.

From the table below we can see that 87% of services have arrived within 5 minutes of their advertised time. Looking across all 1.5m train records in the table below, we can see that this is made up of 63% of trains that arrive early or on time, and 24% of trains that are between 1 and 4 minutes late.

| | GE To London | GE From London | WA To London | WA from London | Total |
|---|---|---|---|---|---|
| 1. RT or Early | 227,978 | 224,213 | 187,263 | 286,648 | 926,102 |
| 2. 1-4mins Late | 87,153 | 89,466 | 120,882 | 48,349 | 345,850 |
| 3. 5-14mins Late | 39,031 | 39,199 | 34,804 | 20,396 | 133,430 |
| 4.15-29mins Late | 8,283 | 8,866 | 5,864 | 4,584 | 27,597 |
| 5.30-59mins Late | 2,146 | 2,893 | 1,319 | 950 | 7,308 |
| 6. 60+mins Late | 348 | 662 | 171 | 105 | 1,286 |
| 7. Cancelled/Other | 6,356 | 7,384 | 6,830 | 7,180 | 27,750 |
| Grand Total | 371,295 | 372,683 | 357,133 | 368,212 | 1,469,323 |
| | | | | | |
| 1. RT or Early | 61% | 60% | 52% | 78% | 63% |
| 2. 1-4mins Late | 23% | 24% | 34% | 13% | 24% |
| 3. 5-14mins Late | 11% | 11% | 10% | 6% | 9% |
| 4.15-29mins Late | 2% | 2% | 2% | 1% | 2% |
| 5.30-59mins Late | 1% | 1% | 0% | 0% | 0% |
| 6. 60+mins Late | 0% | 0% | 0% | 0% | 0% |
| 7. Cancelled/Other | 2% | 2% | 2% | 2% | 2% |
| Grand Total | 100% | 100% | 100% | 100% | 100% |

In general, with a high proportion of trains running within just a few minutes of scheduled time, the instance of significant delay is relatively small.




This has implications for both the number of passengers affected (numbers on any one day and the frequency with which individual travellers may experience delay) and the sample size of passengers surveyed who have experienced delay.

Measured customer satisfaction is likely to be driven by both delay experienced by a respondent on the day on which the survey was carried out, and on the experience the individual may have had on previous journeys. This may go some way to explain the difference in NPS scores between (frequent) commuters and (infrequent) leisure travellers.

### 4.4 Cancellations

The table above shows that 2% of services were either cancelled or did not run as advertised. In fact only 1.2% of services were cancelled, with a further 0.5% recorded as having not completed their scheduled journey (i.e. they were cancelled somewhere en route). A further 0.2% of services were diverted, or not recorded, most relating to West Anglia route services diverted via Seven Sisters.

## 5 Passenger Delay

### 5.1 Measuring Passenger lateness

#### *5.1.1 Weighting Delay to Reflect Passenger Numbers*

General industry performance measures, such as PPM, record the performance of trains without reference to the number (or type) of passengers travelling on those services.

The NPS survey seeks to obtain a representative measure of satisfaction for all passengers being carried by the Train Operating Company (TOC), and therefore needs to be (and is) weighted by the number of passengers being carried by each TOC. As discussed earlier, in order to consider values by service group or time of day we have re-weighted the NPS values accordingly.

To provide a weighted value for passenger delay each weekday service has been provided with its average passenger load using data created from MOIRA (see section 1.4.3. This will increase the importance of the punctuality of those trains during the peaks with the highest loads, and reduce the importance of more lightly loaded services. This should better reflect the results obtained from the NPS survey, since they are weighted to number of passengers carried.

The passenger load for those joining or alighting at London Liverpool Street has been obtained from MOIRA. Using these predicted passenger loads by ticket type, these numbers have been split into journey purpose (Business, Commuter, Leisure) using the average proportions obtained from the NRTS. This allows passenger loads by train to be aggregated into comparable passenger groupings to those within NPS and will provide a weighted sample of passengers by time of day.

#### *5.1.2 Measuring Passenger Lateness for Services from London*

For services travelling away from London, most passengers will have alighted from the service before arrival at the final destination of the train and therefore may have experienced a different level of delay. To some extent this is affected by the standard practice for train services to include an allowance for late running or time to use alternative platforms at the final destination of the train.

In the following analysis where we examine how customer satisfaction varies with train performance measures, we will only consider those passengers joining or alighting at London Liverpool Street. This means that such allowances are not an issue for trains arriving at Liverpool Street as the measured lateness will reflect the advertised time and any lateness experienced by those passengers included within the analysis.

However, for services departing from London, trains approaching their final destination, such as Clacton, may have a difference between the planned (working)

timetable and the public (advertised) timetable. As a result, in the example of Clacton, this might mean the majority of passengers alighting at stations such as Chelmsford or Colchester might experience a slightly worse delay than that measured at Clacton (although the value of any 'benefit' between the lateness measured at the final destination and that experienced at intermediate stations is likely to be small).

To confirm the impact this may have we took the train punctuality records from 'Bugle' for the time of each train at a sample of monitoring points along the train journey, as well as its final destination. To provide a spread of intermediate stations, which are also monitoring points, and reflect the busiest parts of the network, the following monitoring points were considered:

- Romford
- Gidea Park
- Wickford
- Chelmsford
- Colchester
- Ipswich
- Seven Sisters
- Walthamstow Central
- Harlow Town
- Bishops Stortford

In total we considered observations from a sample of 100,000 trains for weekday services departing London Liverpool Street and for each destination station serving that intermediate station. The record of the train lateness at the intermediate stations was obtained and matched to the lateness at the train's final destination. The table below summarises how average lateness at the intermediate stations differs from the average lateness of the train's final destination during the peak (dep. 1600-1800hrs).

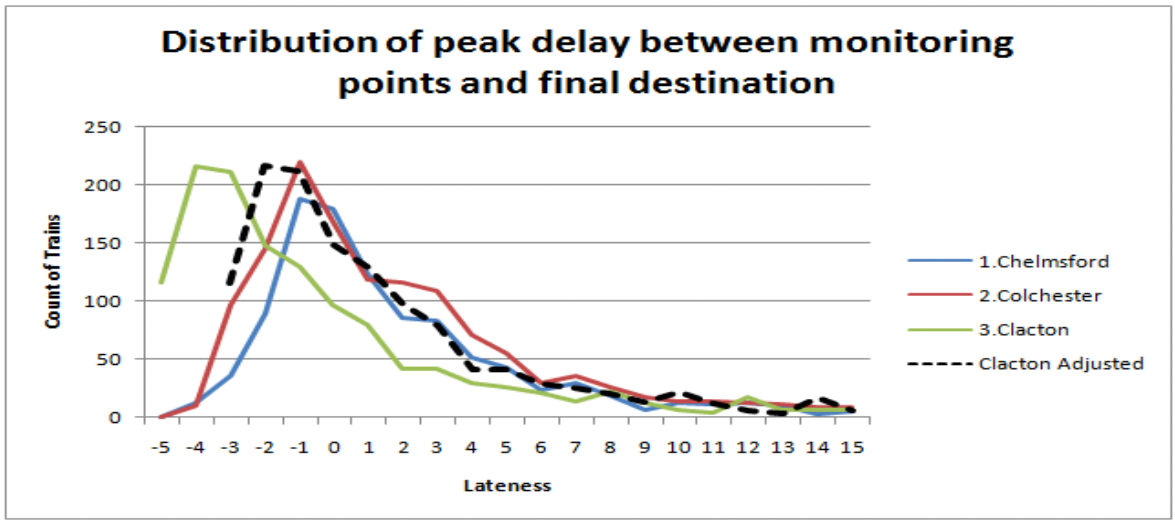
| Destination | Waltham Central | Seven Sisters | Harlow Town | Bishops Stortford | Romford | Gidea Park | Wickford | Chelm | Colchstr | Ipswich | Final Dest | Diff erence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHINGORD | 0.57 | | | | | | | | | | -1.93 | -2.50 |
| ENFIELDTN | | 1.02 | | | | | | | | | -2.56 | -3.58 |
| CHESHUNT | | 0.09 | | | | | | | | | -0.87 | -0.96 |
| HERTFORDE | | -0.60 | | | | | | | | | -2.04 | -1.44 |
| STANSTDAP | | -0.67 | 1.39 | 1.51 | | | | | | | -1.76 | -3.27 |
| CAMBRIDGE | | -0.67 | 1.60 | 0.95 | | | | | | | -3.83 | -4.78 |
| GIDEAPARK | | | | | 3.51 | | | | | | 0.99 | -2.52 |
| SHENFIELD | | | | | 3.03 | 2.70 | | | | | 1.50 | -1.20 |
| STHENDVIC | | | | | 3.55 | 3.24 | 1.29 | | | | -0.29 | -1.59 |
| STHMINSTER | | | | | | | 1.31 | | | | 0.46 | -0.85 |
| WITHAM | | | | | | | | 0.67 | | | -1.51 | -2.18 |
| BRAINTREE | | | | | | | | 2.67 | | | -0.06 | -2.73 |
| COLCHESTER* | | | | | | | | 0.33 | | | 2.11 | 1.78 |
| CLACTONOS | | | | | | | | 2.37 | 2.83 | | 0.55 | -2.28 |
| IPSWICH | | | | | | | | 2.76 | 4.39 | | 2.44 | -1.95 |
| HARWICH T | | | | | | | | -0.12 | 0.93 | | -0.08 | -1.01 |
| NORWICH | | | | | | | | -0.11 | 5.05 | 7.43 | 5.42 | -2.02 |
| PETERBORO | | | | | | | | | 3.42 | 2.32 | -3.06 | -5.38 |

In this table a negative value in the Difference column shows that on average trains gained time against schedule between intermediate stations and their final destination. For example, looking at trains to Clacton we can see the average lateness at the first monitoring point, Chelmsford is 2.37 minutes, which then increases to 2.83 minutes at the second monitoring point, Colchester. However, at the final destination the average train lateness is only 0.55 minutes. The difference -2.28 minutes means that on average each train gained 2 minutes against its scheduled time between the intermediate station (Colchester) and the final destination (Clacton). This is likely to be accounted for by allowances between the intermediate station and the final destination. APPENDIX D graphically displays how the average lateness at the intermediate station en route differs from the train's final destination during the peak for each of the points considered.

The values found for the majority of stations suggests that the value of the allowance at the final destinations accounts for much of the difference in punctuality between the intermediate and the final destination.

Only Colchester shows an increase in lateness between its intermediate points and trains terminating there; perhaps suggesting a larger allowance would be appropriate for trains terminating there. The graph for Norwich services in APPENDIX D also shows how lateness accumulates en route on the services and that the allowance at the final destination is insufficient to offset the accumulated delay. APPENDIX E shows how delay is distributed en route compared to the train's final destination for both peak and off-peak services.

Therefore, to reflect the difference in lateness that most passengers will experience compared with (the much smaller number of passengers) alighting at the train's final destination, for those trains originating at London Liverpool Street, each train's lateness has been adjusted to reflect the timetable allowance for that train at its final destination and time band (peak/off-peak). The graph below shows how the average lateness at Clacton has been adjusted to reflect the differences in lateness that most passengers will experience.




It is recognised that this carries some degree of approximation for passenger lateness. The alternative would be to ignore the allowance (which evidence suggests is not appropriate) or would otherwise require the lateness of each service to be monitored along its scheduled route and weighted for the proportion of passengers alighting from the different stations (which is outside the scope of this study).

### *5.1.3 Cancellations*

Ascribing passenger delay to services that have been cancelled or terminated en route etc. is particularly difficult. This is because the alternative choices available for passengers (and therefore length of wait) will be different for each station. For example, if a train to Braintree is cancelled, passengers for Witham or Chelmsford, who form the majority of passengers travelling on the service, will often have a shorter wait than those travelling to Braintree. There may also be alternative arrangements possible, such as unscheduled train or road services from Witham to Braintree.

The issue will be different for different services across the day, and therefore to provide a basis upon which passenger delay may be estimated, we have allocated a 'service headway' to each individual train service, based upon its service group and whether it is a peak or off-peak service. This service headway is largely judgemental, but based upon weighting of passengers to stations within each service group (from MOIRA), so as to reflect the weighted average wait for passengers if a single train is cancelled. Where a train is recorded as not completing its scheduled journey, the value of passenger delay is assumed to be half the service headway.

However, many cancellations are the result of infrastructure failures or other severe disruption, and in such cases there will often be multiple cancellations, resulting in longer passenger delays than the service headway. For the bulk of this analysis we have ignored this aspect, since the total number of cancellations is small (2%).

That said, this aspect could subsequently be examined in more detail through examining the overall level of delay, using values from recorded train lateness, or calculated from cancellations, using the service headway, for a particular service group on a particular day, and we can then consider how often total delay exceeds a given threshold to identify occasions when services were severely disrupted and count the frequency with which such instances occurred.

### *5.1.4 Sample Size*

From the table in section 4.3, we can see that 87% of trains arrived at their destination within 5 minutes of their scheduled time. If the sample of passengers surveyed is a good representation of all services, would expect a similar level of punctuality to be experienced by the respondents of the NPS survey. In fact, our analysis of the NPS sample shows that only 75% of those surveyed arrived at their destination with 5 minutes of the scheduled time (i.e. the service experienced by those surveyed in the NPS was worse than that seen across all train services).

| | A. GEI/GES | B. GEML | C. WA | Grand Total | % |
|---|---|---|---|---|---|
| 1. RT or Early | 438 | 896 | 1050 | 2384 | 48% |
| 2. 1-4mins Late | 278 | 656 | 428 | 1362 | 27% |
| 3. 5-14mins Late | 146 | 581 | 201 | 928 | 19% |
| 4.15-29mins Late | 11 | 135 | 37 | 183 | 4% |
| 5.30-59mins Late | 5 | 75 | 25 | 105 | 2% |
| 6. 60+mins Late | | 9 | | 9 | 0% |
| 7. Cancelled/Other | 3 | 31 | 8 | 42 | 1% |
| **Grand Total** | **881** | **2383** | **1749** | **5013** | 100% |

This difference may be due to sampling variation, but may also be due to the variation in passenger loads across train services.

In the section below 5.2 Passenger Lateness Analysis, we have identified how passenger lateness differs from train lateness, by taking into account train loadings, timetable allowances and the impact of cancellations. From this we have identified that 81% of passengers arrived at their destination within 5 minutes of their scheduled time, which is worse than the value for trains, but still better than the value recorded by NPS respondents.

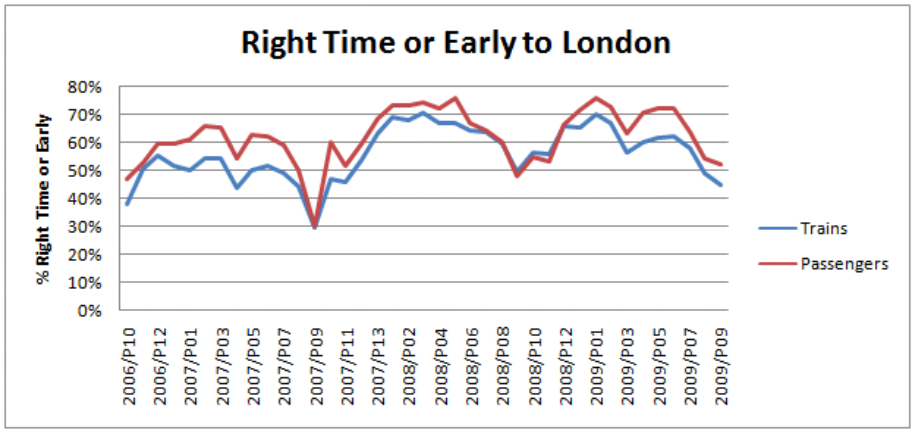
Furthermore, from the NPS sample, 7% of respondents suffered from a delay of 15 minutes or greater, or were affected by a train cancellation. This is a small sample from which to draw conclusions from those affected by longer delays, but is significantly more than the 4% we might expect from the analysis of the number of trains and just higher than the 6% we might expect when considering passenger lateness.

In addition to issues surrounding measurement, this might also suggest that passengers who suffer delay have a higher propensity to complete the NPS questionnaire, and therefore, all other things being equal, we might therefore expect NPS results to be worse than TOC performance suggests.

## 5.2 Passenger Lateness Analysis

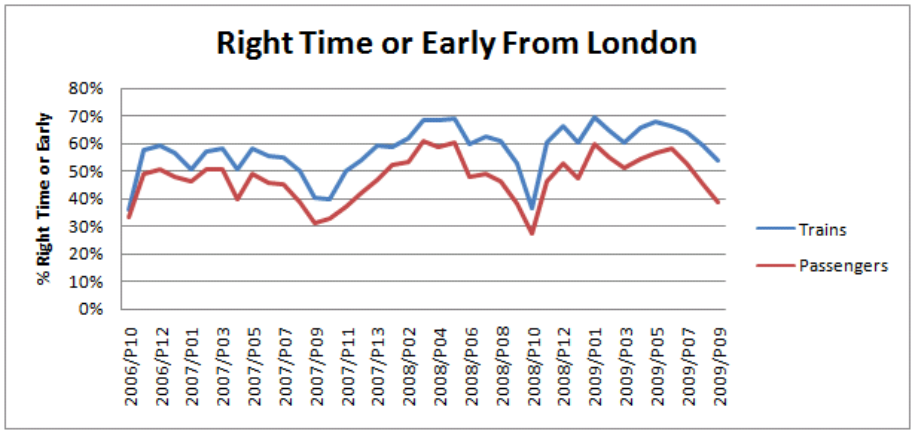
Using the processes described above, we can consider whether there is a difference between the number of trains arriving on time and the number of passengers arriving on time. The graphs below compares train punctuality and passengers arriving to/from London right time or early from December 2005 (2006/P10), which coincides with the West Anglia timetable change.

This suggests that the percentage of passengers arriving right time or early to London is generally higher than trains arriving right time or early, and which suggests that overall, those trains carrying higher numbers of passengers to London have better punctuality than those carrying fewer.




However, looking at services away from London tells a very different story, whereby fewer passengers arrive on time or early at their final destination compared to the percentage of trains. This may be affected by assumptions we have made in respect of punctuality of services at intermediate stations (see section 0 above), but appears

consistent with NPS results showing a sustained low level of satisfaction for commuters on evening services from London.



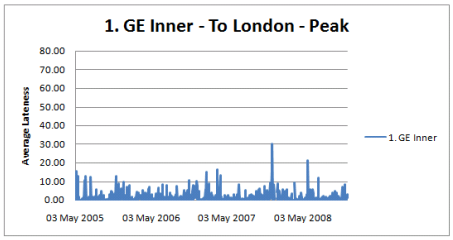

## 5.3 Variation in Peak Delay

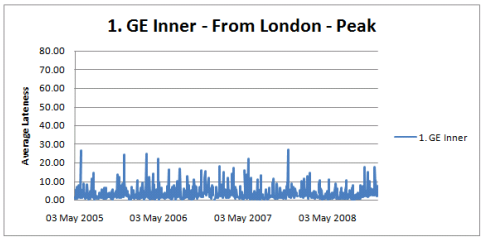
From the analysis above, on average 62% of weekday passengers arrive right time or early to London, whereas only 48% of passengers arrive right time or early at their final destination from London.

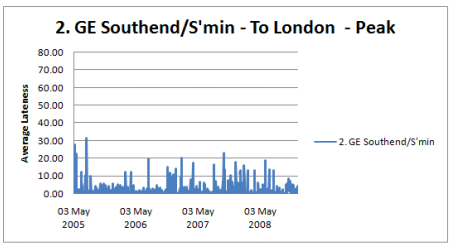
These averages may be the result of a consistent day-by-day level of punctuality, or may be the result of a high level of punctuality, interspersed with a few occasions of large delays.

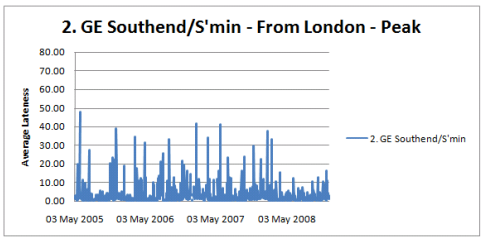
To illustrate this across all 1.5m train records we can plot the delay by service groups to and from London. The graphs below show the amplitude and variation of peak delay is much greater on GE services compared with WA services. Furthermore, over the whole period in question, there is also a noticeable difference between services to London and those from London, with services from London showing a very high degree of variation, especially on GE services. With delay much more unpredictable on GE services, this has implications for both the number of passengers affected and the frequency with which individual travellers may experience delay during peak times.

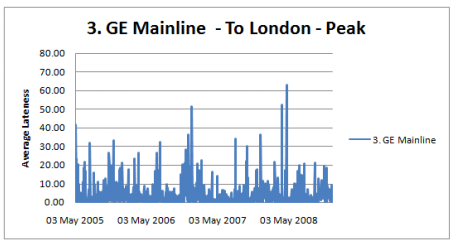
**Average Peak Lateness to/from London by day**

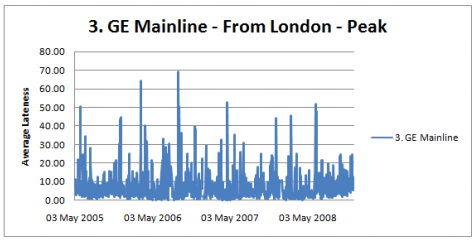


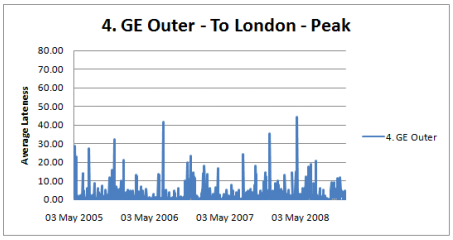



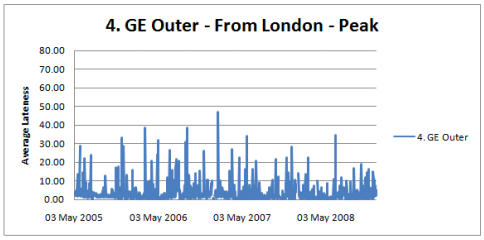



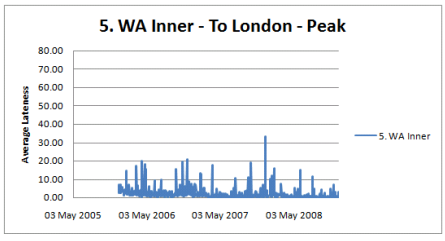



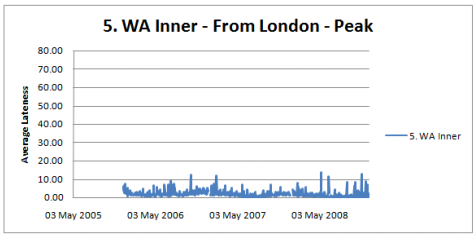



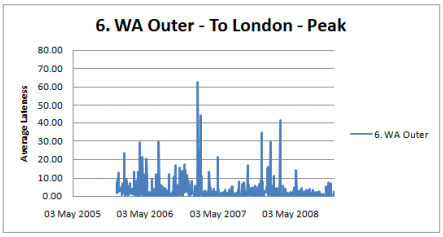



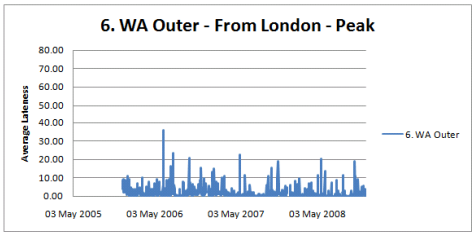



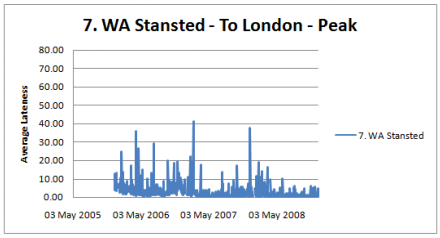

**Average Peak Lateness to/from London by day**

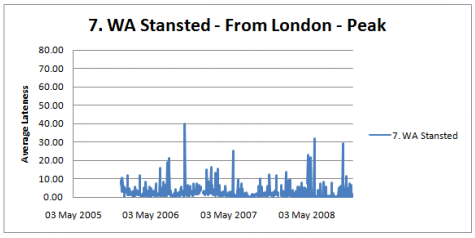


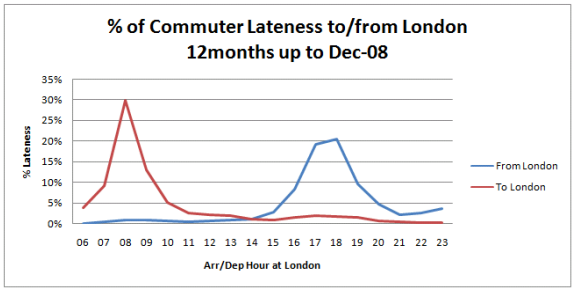



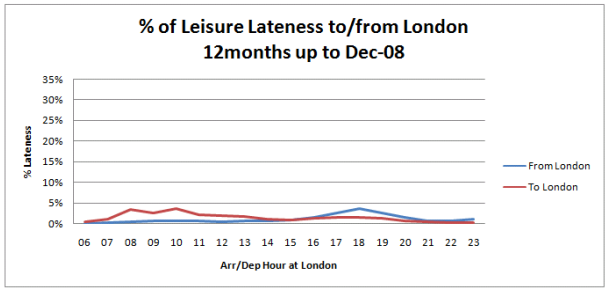
Looking across West Anglia services, with the exception of West Anglia Inner suburban services the variation in delay is relatively stable with a small number of days being badly disrupted. Even though satisfaction scores for WA Inner and WA Outer are very similar, 71% and 70% respectively, the frequency of service on WA Inner is higher compared to WA Outer services during the peak.

## 5.4 Aggregate Passenger Lateness

The variation in delay will have implications on both the number of passengers affected and the frequency with which they experience the delay.

We can see how aggregate passenger lateness varies by time of travel and direction over the last 12 months, up until December 2008. As expected aggregate commuter lateness to/from London reaches its zenith during the morning and evening peak. However, a noticeable difference in aggregate commuter lateness from London is the fact that lateness begins to increase well before the evening peak, while in contrast, the morning peak (to London) flattens out immediately after 10am.




On the other hand aggregate leisure lateness to/from London is relatively low and consistent throughout the day, with a marginal increase during the peak times. The aggregate lateness experienced by passengers is also reflected in their satisfaction score.

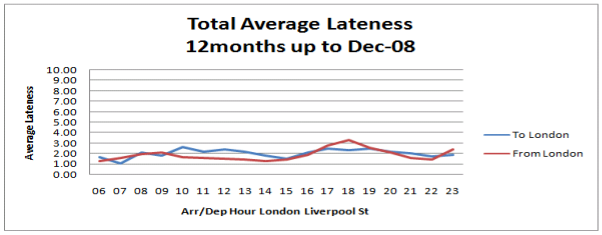
## 5.5 Average Passenger Lateness

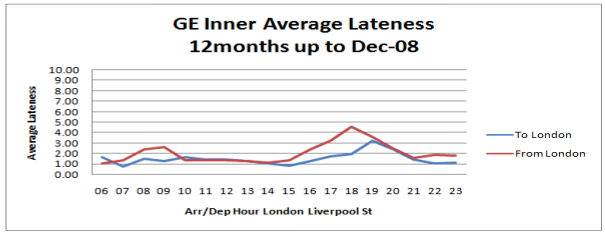
Using the number of passengers travelling on each service, and the lateness of each service on each day, we can calculate the average lateness experienced by passengers on different groups of services.

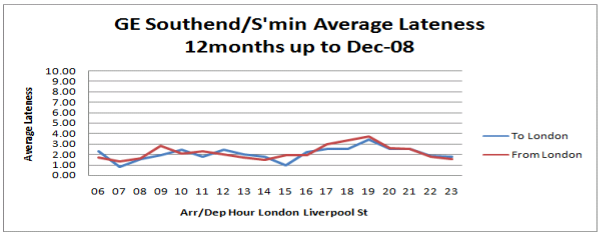
The graphs below show how average lateness has varied by direction and time of day for each service group for the period of 12 months up until December 2008.

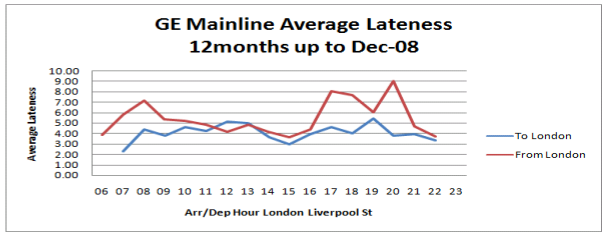
These results highlight the finding that delay on GE Mainline services is considerably higher throughout the day compared to other Great Eastern and West Anglia service groups, and is higher still in the peak periods.

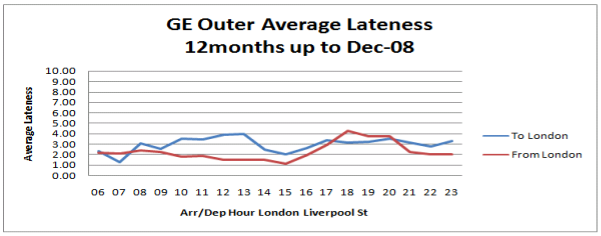
It also shows that the evening peak period is worse on GE services than the morning. This is not reflected on WA services, which we might otherwise expect to be the case if the results were materially affected by our assumptions on passenger lateness for services leaving London.

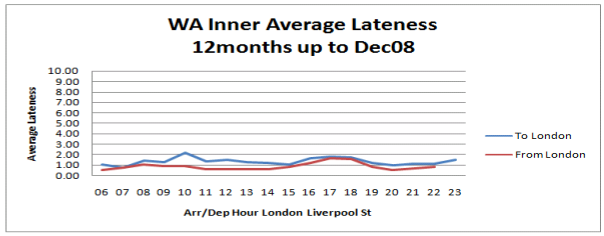


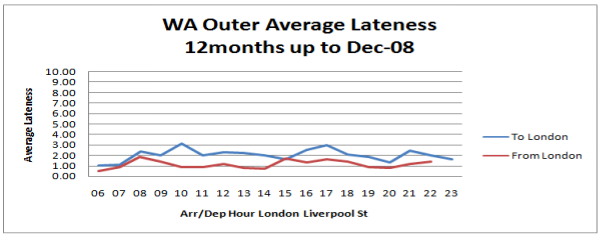



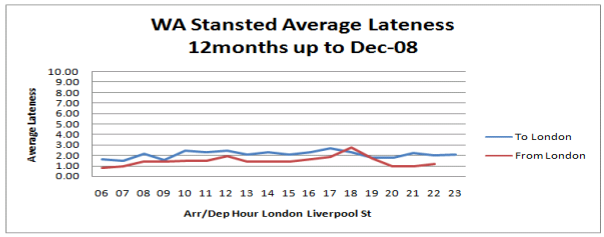




Broadly speaking, the direction of travel show signs of those travelling from London on West Anglia services experiencing a slightly lower average lateness than those travelling to London. This coincides with the findings that West Anglia services from London are more punctual than those to London.

However, across Great Eastern services there is greater variation in average passenger lateness by time of day. With the exception of GE Outers, the average lateness during the evening peak is generally greater than that of the morning peak. This corresponds with poorer performance experienced by GE passengers during the evening peak.

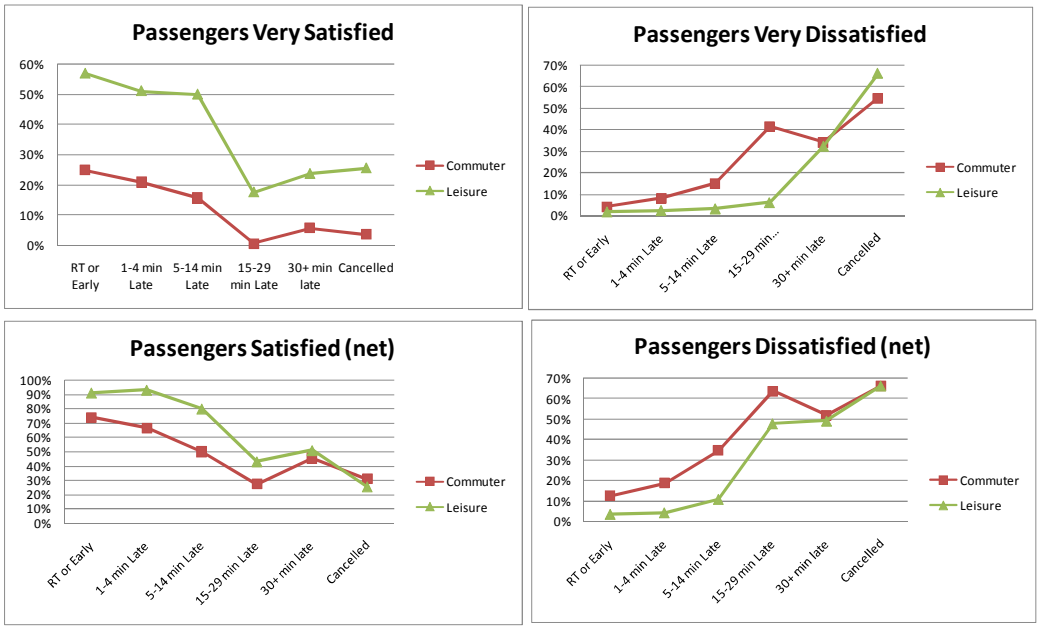
# 6 NPS Satisfaction & Delay Experienced on the Day Surveyed

## 6.1 Variation by Journey Purpose and Length of Delay

For all NPS respondents travelling to or from London over the study period, we have used the train service they actually used on the day they were surveyed, and recorded for the train, the level of delay experienced by the respondent on the day they were recruited to the survey.

Analysis of this data identifies that (as expected) the rating given by respondents is heavily influenced by their experience of performance on the day of the survey. It is also influenced by the journey purpose (e.g. commuter/leisure).

The results show that even where the service the respondent has travelled on has arrived as advertised (i.e. right time or earlier), that still only 74% of commuters and 91% of travellers are satisfied. Furthermore only 25% of commuters and 57% of leisure travellers are very satisfied in these instances.

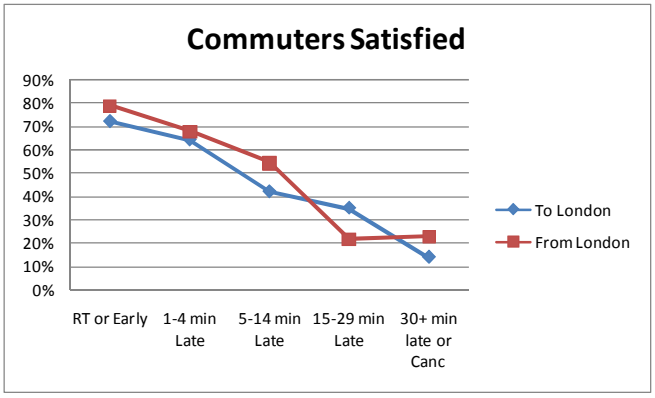



The 'shortfall' below 100% might provide some indication of the influence that previous journeys might have on overall satisfaction scores. The finding that the leisure travellers are much more influenced by today's travel than commuters would be consistent with this, given the average frequency of travel for these groups. The NRTS suggests that 77% of commuters travel 5-days per week, whereas 70% of leisure passengers travel less than once every month (or have not travelled before).

Leisure travellers appear more accepting of delays, with a very low level of dissatisfaction up to a threshold of around 15 minutes and are mirrored in the fall of in levels of satisfaction.

## 6.2 Variation by Direction

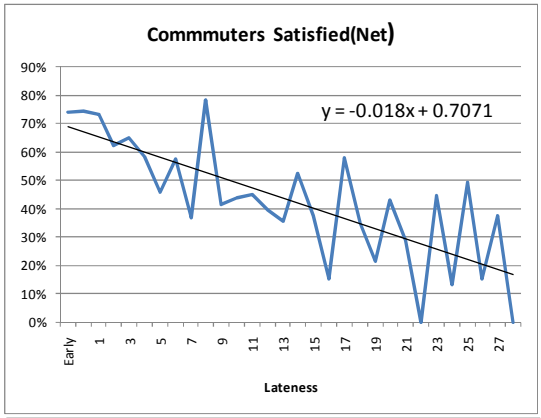
Across the entire sample, the direction of travel exhibits a small, but potentially material, difference, with those travelling from London being marginally more satisfied than those travelling to London. However, this may well simply reflect the finding that services from London are more punctual than those to London.

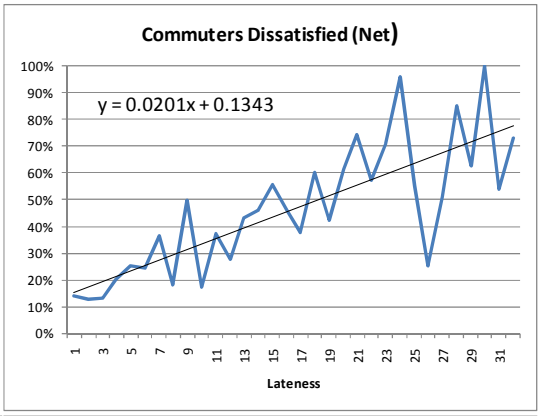


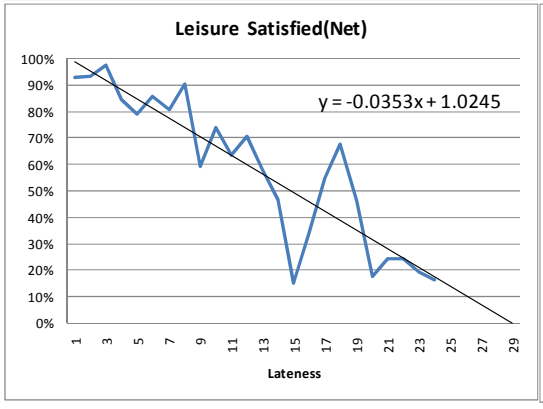

Using this combined information we can compare the satisfaction rating given by respondents on the day they travelled with the lateness of the service they travelled on.

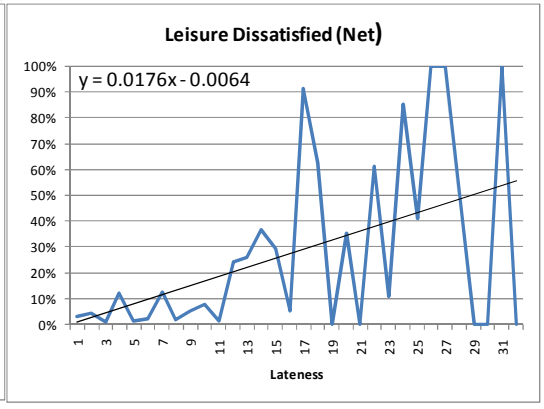
## 6.3 Relationship between Survey Delay and Satisfaction Scores

The results appear to show a strong (and largely linear) relationship between the level of satisfaction, and the level of delay experienced on the day of travel. The results are affected by the sample size, particularly at higher levels of delay since, (as we would expect) relatively few passengers are affected by larger delays. That said, sample sizes are sufficient, particularly for lower levels of lateness, to draw clear results.



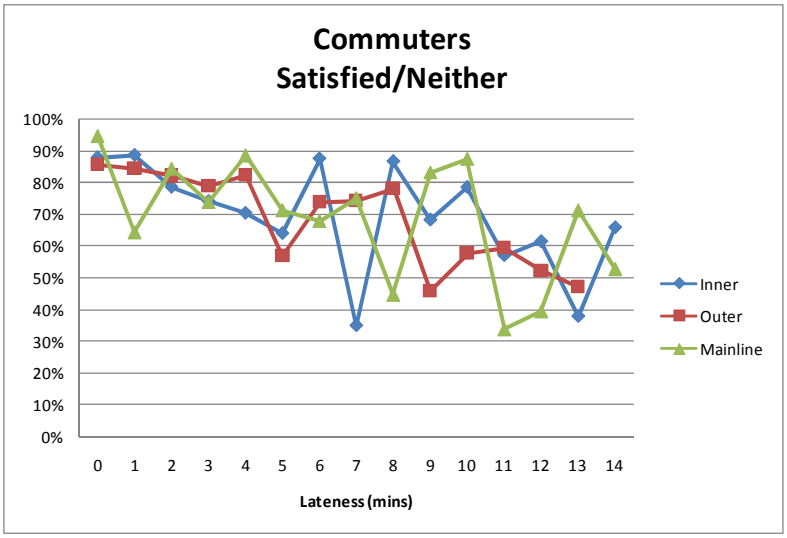



The gradient of the satisfied commuters' graphs suggests that the proportion of satisfaction changes by around 2% for every minute of lateness on the day of travel.

### 6.4 Impact of Journey Distance

We might expect that the rate of decline in satisfaction may be related to the level of lateness in proportion to the scheduled journey time. If this is the case then we would expect inner suburban service groups to show a different profile to outer and mainline service groups. The sample sizes for respondents who have been delayed is too small to undertake this analysis for each minute of lateness, but grouping together service groups we can see there is no discernable difference between longer and shorter distance journeys.




## 7 Correlation Analysis

### 7.1 Basis for Correlation Analysis

In seeking to gain a better understanding of the relationship between train or passenger delay and passenger satisfaction, we have undertaken a series of linear regression analysis using the "least squares" method to fit a line through a set of observations.

In considering how to approach this analysis we have been informed by the forgoing, which has established:

- Appropriate weightings for use with passenger delays
- A measure of passenger lateness taking into account journeys to intermediate stations and loadings on each service
- The importance of journey purpose, which probably reflects frequency of travel
- Sample sizes suggest correlations should be carried out at aggregate TOC/route level.
- NPS scores are highly related (but not confined) to the experience the respondent experienced on the day they travelled.

Analysis was undertaken using railway periods as the time dimension. This ensured a reasonable sample size, whilst reflecting differences on a four-week by four-week basis.

Correlations were considered separately for Commuters and Leisure passengers at TOC level and then compared with results on each route.

## 7.2 Correlations Considered

The following measures were considered as a basis for finding a correlation with passenger satisfaction.

1. Count of passengers affected by trains delayed by over 10mins only.
2. Count of passengers affected by trains delayed by over 20mins only.
3. Count of days when more than 25% of services were delayed by over 20mins or cancelled
4. Count of passengers affected by delays which are greater than 25% of their scheduled journey time
5. Count of passengers affected by delays which are greater than 50% of their scheduled journey time
6. Value of Average Passenger Delay Minutes
7. Weighted Average Passenger Delay Minutes.

However, the initial analysis found that the approach needed to be modified, and to concentrate on the probability of services arriving right-time, or within a few minutes of right-time.

## 7.3 Correlation Results

For a given set of data, a wide range of numerical correlations might be found. The results presented here ignore those correlations which purported to explain the relationship between the variables, but which were implausible, such as satisfaction increasing with a measure of performance that is getting worse.

In interpreting these results it is also important to take into account that different time-bands for levels of lateness are likely to be themselves highly correlated with others. i.e. the number of passengers arriving within 5 minutes of the scheduled time is likely to be closely related to those both arriving on time or 10 minutes late.

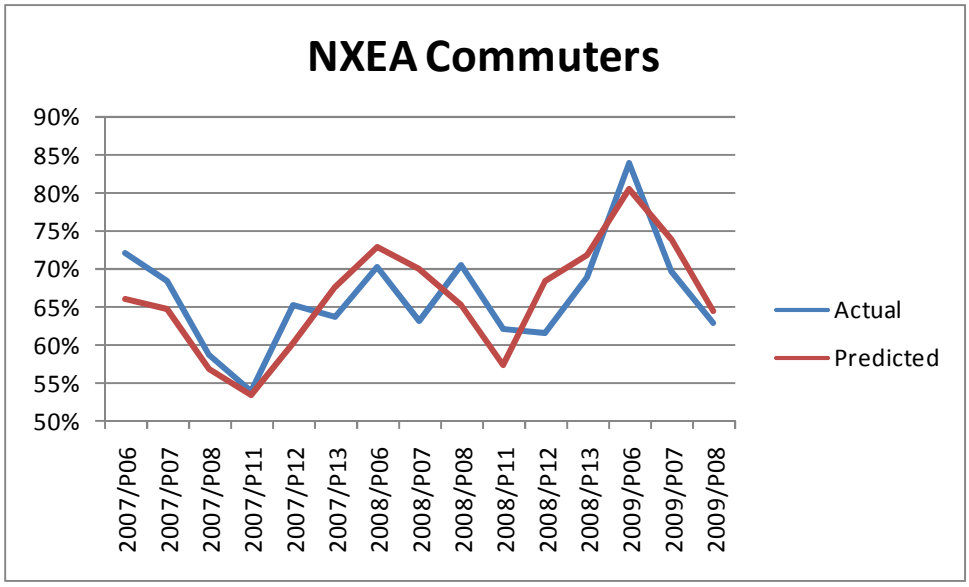
## 7.4 Commuter Correlation

A ‘best-fit’ correlation was found for commuters at TOC level which takes into account the proportion of services arriving ‘right-time or early’ for the most recent period as well as those for the previous two periods. The impact of each period is different, with the current period being the most highly weighted.

% Satisfied = [%RTE]*0.922+[%RTE-1]*0.196+[%RTE-2]*0.091

Where

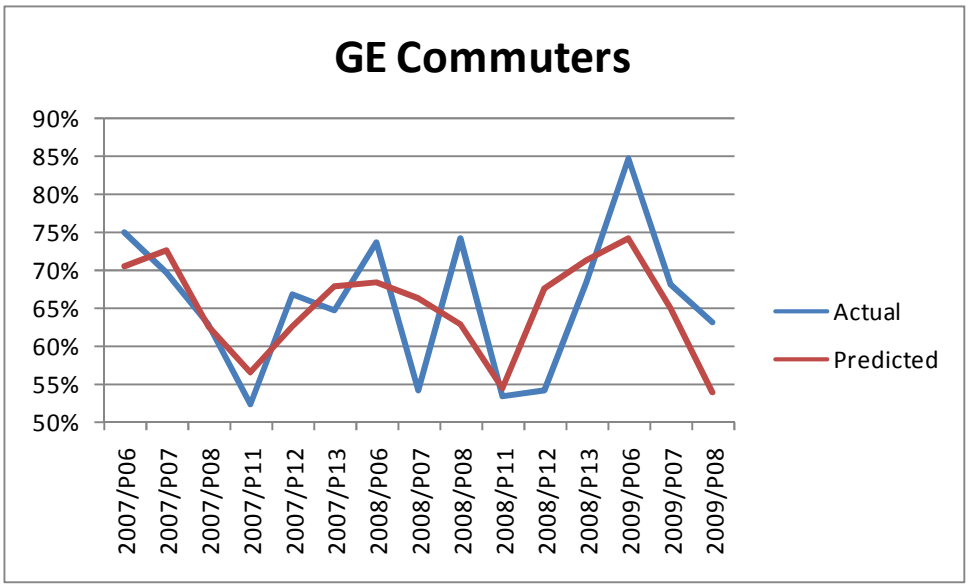
RTE = % Passengers arriving right-time or early in current period
RTE-1 = % Passengers arriving right-time or early in previous period
RTE-2 = % Passengers arriving right-time or early two periods ago




Other good fit solutions were found across a range of similar formulae.

If this formula is applied to WA and GE routes separately, the degree of 'fit' is not so good, but may be the result of sample sizes.

These results are consistent with the hypothesis, supported by previous analysis, that NPS respondents are highly influenced by the level of punctuality they experience on the day of travel, but are also affected by their previous experience.

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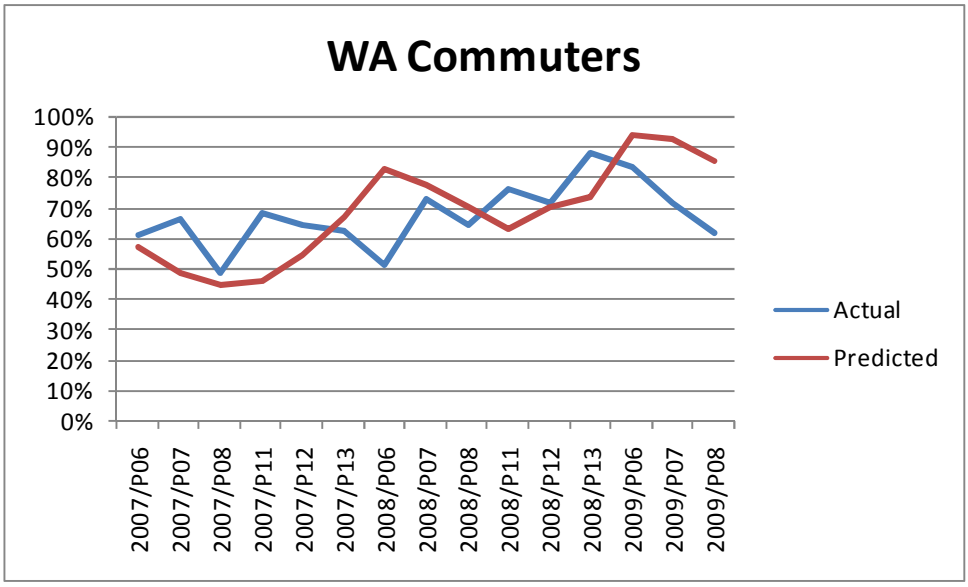



## 7.5 Leisure Correlation

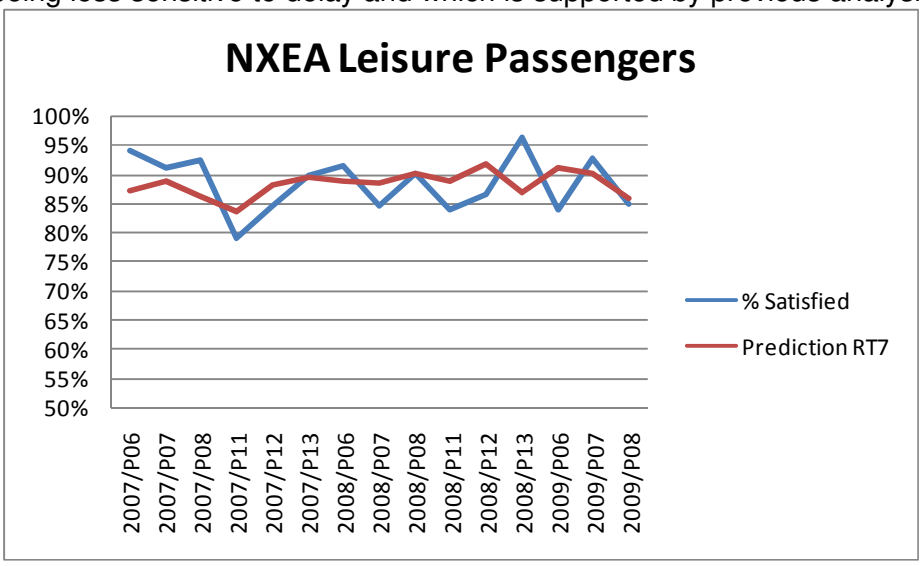
Obtaining a meaningful correlation for leisure travellers was in many ways more challenging because of the generally high levels of satisfaction recorded, and the relatively low sample size.

More complex correlations with more than one variable did not produce plausible results, and therefore the 'best fit' correlation uses the point at which the proportion of trains within a given level of lateness is close to the level of satisfaction for these services. The relationship selected is therefore

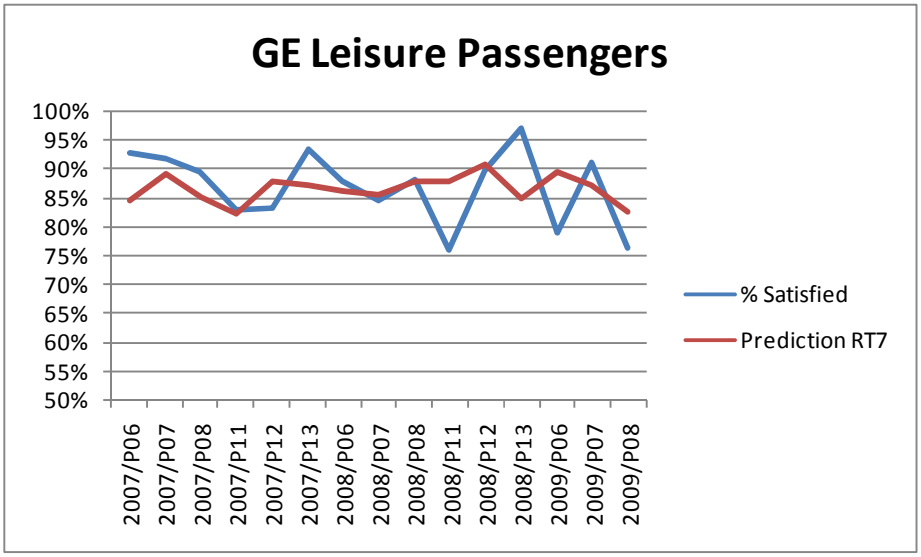
% Satisfied = %RT7

Where %RT7 = % passengers arriving within seven minutes of their scheduled time.

This would be consistent with leisure passengers travelling less frequently, and also being less sensitive to delay and which is supported by previous analysis.




and provides a reasonable result for each route.


GE Leisure Passengers
100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%
2007/P06
2007/P07
2007/P08
2007/P11
2007/P12
2007/P13
2008/P06
2008/P07
2008/P08
2008/P11
2008/P12
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2009/P08
% Satisfied
Prediction RT7

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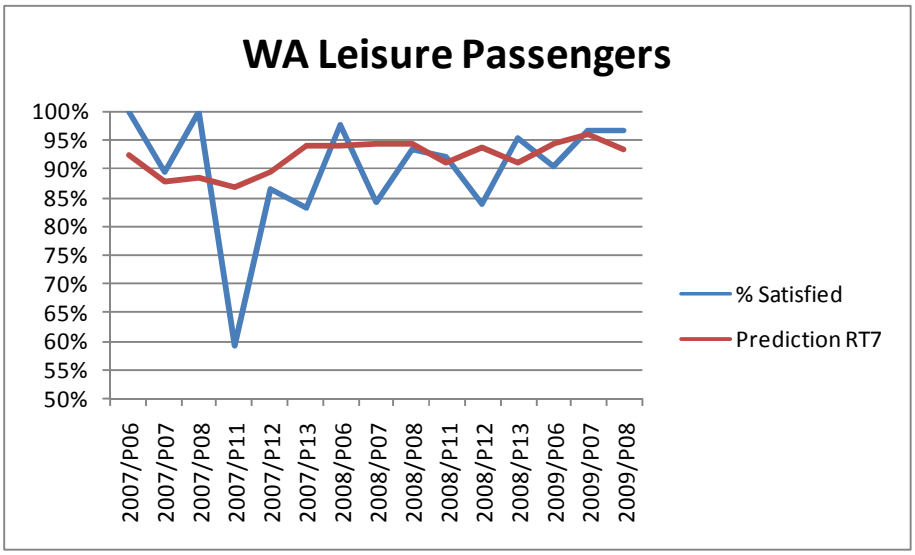

WA Leisure Passengers
100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%
2007/P06
2007/P07
2007/P08
2007/P11
2007/P12
2007/P13
2008/P06
2008/P07
2008/P08
2008/P11
2008/P12
2008/P13
2009/P06
2009/P07
2009/P08
% Satisfied
Prediction RT7

## 8 Impact of Crowding

The analysis has so far not included any assessment of the impact crowding might have on the level of satisfaction passengers might have with performance or delays.

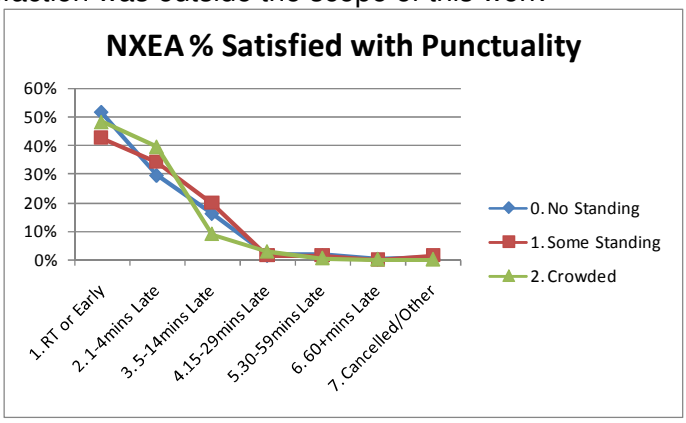
Considering the results from the NPS survey, we can see that where the rating for "sufficient room to sit/stand" is rated very poor, the respondent is more likely to be very dissatisfied with punctuality.

| | | 1. VERY SATISFIED | 2. FAIRLY SATISFIED | 3. NEITHER SATISFIED NOR DISSATISFIED | 4. FAIRLY DISSATISFIED | 5. VERY DISSATISFIED | Grand Total |
|---|---|---|---|---|---|---|---|
| Sufficient room | 1. VERY GOOD | 5% | 2% | 0% | 0% | 0% | 7% |
| Sufficient room | 2. FAIRLY GOOD | 10% | 12% | 2% | 2% | 1% | 28% |
| Sufficient room | 3. NEITHER GOOD NOR POOR | 4% | 9% | 2% | 1% | 1% | 18% |
| Sufficient room | 4. FAIRLY POOR | 4% | 9% | 3% | 2% | 1% | 18% |
| Sufficient room | 5. VERY POOR | 3% | 11% | 4% | 5% | 6% | 29% |
| **Sufficient room** | **Grand Total** | **26%** | **43%** | **11%** | **11%** | **9%** | **100%** |

By considering both the lateness of each respondents train and the level of crowding, we can see whether for the same level of delay, there is a lower level of satisfaction for punctuality if the train is more crowded.

| | 0. No Standing | 1. Some Standing | 2. Crowded | Grand Total |
|---|---|---|---|---|
| 1. RT or Early | 52% | 42% | 48% | 50% |
| 2. 1-4mins Late | 29% | 34% | 40% | 31% |
| 3. 5-14mins Late | 16% | 20% | 9% | 16% |
| 4.15-29mins Late | 1% | 1% | 3% | 1% |
| 5.30-59mins Late | 1% | 1% | 0% | 1% |
| 6. 60+mins Late | 0% | 0% | 0% | 0% |
| 7. Cancelled/Other | 0% | 1% | 0% | 0% |
| **Grand Total** | **100%** | **100%** | **100%** | **100%** |

This suggests that overall there is no apparent impact of crowding on the rating given for punctuality. Please note, however, that examining the impact of crowding on Overall Satisfaction was outside the scope of this work



# 9 Conclusion

Our findings are

More Generally:

- Overall satisfaction with train services is dominated by satisfaction with punctuality.
- Passenger lateness differs from measures of train lateness, due the effect of cancellations and to difference between lateness of a train at intermediate stations and the lateness of a train at its final destination.
- There is a strong (and largely linear) relationship between the level of satisfaction, and the level of delay experienced by the passenger on the day of travel.
- Journey purpose is an important consideration in the level of satisfaction, with commuters less satisfied than leisure passengers. This appears to be related to the frequency of travel, with commuters taking their experience over the previous three months into consideration when recording their level of satisfaction.
- Train services with a high proportion of commuters have lower levels of satisfaction than those with a high proportion of business and leisure travellers, even at the same level of performance or delay.
- Leisure travellers appear to be less sensitive to small levels of delay.
- Comparisons of satisfaction with punctuality between different services are best undertaken by considering the same journey purpose only.
- Journey distance has little or no bearing on the level of satisfaction for a given level of lateness.
- Levels of crowding do not have a material impact on the level of satisfaction expressed for punctuality
- The current process used in the weighting of NPS reflects how passenger volumes vary by station. When measuring the impact of performance the weightings by service group or time of day (particularly in the evening) may be more appropriate. Therefore weightings applied to NPS responses should be reviewed.

For NXEA services in particular:

- West Anglia route services have improved. This improvement coincides with changes at the December 2005 and December 2006 timetable changes.
- Punctuality is worse in the peak periods, particularly in the evening peak across all Great Eastern (GE) route services.
- Average *passenger* lateness for evening peak services is worse than that indicted by *train* lateness, because most people disembark before the terminating station.
- GE route services show a strong variation by season, with autumn services consistently a number of percentage points worse than the best results achieved during the summer.
- GE Mainline services (London<>Norwich) are by far the worst performing NXEA services, when measured by average passenger lateness.
- Trains terminating at Colchester during the peak appear to have insufficient timing allowance when compared with other services.

## APPENDIX A Sample Size

| To London | NPS Sample | MOIRA Passenger Loads | Re-weighting to be applied |
|---|---|---|---|
| Weekday | 93% | 90% | |
| Saturday | 5% | 6% | |
| Sunday | 3% | 3% | |
| | | | |
| West Anglia | 34% | 32% | |
| Great Eastern | 66% | 68% | |
| | | | |
| 1.GE Inner | 17% | 27% | * |
| 2.GE Southend/S'min | 14% | 14% | |
| 3.GE Mainline | 8% | 11% | * |
| 4.GE Outer | 26% | 17% | * |
| 5.WA Inner | 22% | 18% | |
| 6.WA Outer | 8% | 6% | |
| 7.WA Stansted | 4% | 8% | |
| | | | |
| Weekday Arrival | | | |
| 6 | 1% | 3% | |
| 7 | 11% | 19% | * |
| 8 | 25% | 37% | * |
| 9 | 19% | 16% | * |
| 10 | 12% | 5% | * |
| 11 | 6% | 3% | |
| 12 | 5% | 2% | |
| 13 | 3% | 2% | |
| 14 | 2% | 2% | |
| 15 | 1% | 2% | |
| 16 | 2% | 2% | |
| 17 | 3% | 3% | |
| 18 | 2% | 3% | |
| 19 | 2% | 2% | |
| 20 | 0% | 1% | |
| 21 | 0% | 0% | |

| From London | NPS Sample | MOIRA Passenger Loads | Re-weighting to be applied |
|---|---|---|---|
| Weekday | 87% | 90% | |
| Saturday | 7% | 6% | |
| Sunday | 6% | 3% | |
| | | | |
| West Anglia | 27% | 32% | |
| Great Eastern | 73% | 68% | |
| | | | |
| 1.GE Inner | 9% | 26% | * |
| 2.GE Southend/S'min | 14% | 14% | |
| 3.GE Mainline | 22% | 12% | * |
| 4.GE Outer | 28% | 15% | * |
| 5.WA Inner | 17% | 18% | |
| 6.WA Outer | 7% | 7% | |
| 7.WA Stansted | 3% | 8% | |
| | | | |
| Weekday Departure | | | |
| 6 | | 1% | |
| 7 | 2% | 3% | |
| 8 | 3% | 4% | |
| 9 | 2% | 2% | |
| 10 | 5% | 1% | |
| 11 | 9% | 1% | |
| 12 | 9% | 1% | |
| 13 | 7% | 2% | |
| 14 | 6% | 2% | |
| 15 | 6% | 5% | |
| 16 | 10% | 11% | |
| 17 | 13% | 22% | * |
| 18 | 9% | 17% | * |
| 19 | 4% | 7% | * |
| 20 | 1% | 4% | |
| 21 | 1% | 3% | |
| 22 | | 2% | |
| 23 | | 2% | |

| Weekdays all Journeys | NPS Sample | MOIRA Passenger Loads |
|---|---|---|
| Business | 17% | 12% |
| Commuter | 70% | 72% |
| Leisure | 13% | 16% |

| Weighted travel by Day of Week and Journey Purpose | Business | Commute | Leisure | Grand Total |
|---|---|---|---|---|
| 1. Monday | 22% | 25% | 11% | 22% |
| 2. Tuesday | 20% | 16% | 10% | 15% |
| 3. Wednesday | 21% | 19% | 13% | 18% |
| 4. Thursday | 17% | 20% | 8% | 17% |
| 5. Friday | 13% | 17% | 12% | 15% |
| 6. Saturday | 4% | 2% | 28% | 7% |
| 7. Sunday | 2% | 1% | 17% | 4% |
| Grand Total | 100% | 100% | 100% | 100% |

| Weighted Sample by Gender | |
|---|---|
| FEMALE | 51% |
| MALE | 49% |
| Grand Total | 100% |

| Weighted Sample by Age Group | |
|---|---|
| 16-25 | 11% |
| 26-34 | 20% |
| 35-44 | 25% |
| 45-54 | 23% |
| 55-59 | 9% |
| 60-64 | 6% |
| 65+ | 5% |
| Grand Total | 100% |

| Weighted Sample by Employment Staus | All days | Weekdays Only |
|---|---|---|
| FULL TIME STUDENT | 5% | 4% |
| NOT WORKING | 2% | 2% |
| RETIRED | 6% | 5% |
| WORKING FULL TIME | 79% | 81% |
| WORKING PART TIME | 9% | 9% |
| Grand Total | 100% | 100% |

| Weighted Sample by Departure Hour | All | To London | From London | Other |
|---|---|---|---|---|
| 6 | 2% | 4% | 1% | 1% |
| 7 | 19% | 38% | 3% | 16% |
| 8 | 17% | 28% | 3% | 17% |
| 9 | 9% | 12% | 2% | 11% |
| 10 | 6% | 4% | 3% | 10% |
| 11 | 6% | 3% | 6% | 10% |
| 12 | 5% | 3% | 6% | 8% |
| 13 | 3% | 2% | 3% | 3% |
| 14 | 2% | 1% | 3% | 3% |
| 15 | 3% | 1% | 6% | 3% |
| 16 | 6% | 1% | 12% | 4% |
| 17 | 11% | 2% | 25% | 7% |
| 18 | 7% | 1% | 17% | 4% |
| 19 | 2% | 0% | 5% | 2% |
| 20 | 1% | 0% | 3% | 0% |
| 21 | 1% | 0% | 3% | 0% |
| Grand Total | 100% | 100% | 100% | 100% |
| | | | | |

| Weighted Sample by Origin /Destination Service Group | 1. GE Inner | 2. GE Southend/S'min | 3. GE Mainline | 4. GE Outer | 5. WA Inner | 6. WA Outer | 7. WA Stansted | 8. Other | 9. London | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. GE Inner | 5% | 2% | 0% | 2% | 0% | 0% | 0% | 0% | 10% | 19% |
| 2. GE Southend/S'min | 3% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 5% | 9% |
| 3. GE Mainline | 0% | 0% | 2% | 0% | 0% | 0% | 0% | 0% | 1% | 4% |
| 4. GE Outer | 2% | 0% | 1% | 4% | 0% | 0% | 0% | 0% | 5% | 11% |
| 5. WA Inner | 0% | 0% | 0% | 0% | 9% | 1% | 0% | 0% | 7% | 18% |
| 6. WA Outer | 0% | 0% | 1% | 0% | 1% | 2% | 0% | 0% | 2% | 6% |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 7. WA Stansted | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 1% | 2% |
| 8. Other | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 1% |
| 9. London | 6% | 5% | 3% | 6% | 6% | 3% | 1% | 0% | 0% | 30% |
| Grand Total | 17% | 8% | 7% | 12% | 17% | 6% | 1% | 1% | 32% | 100% |

| Weekdays To/from london | Business | Commute | Leisure | Grand Total |
|---|---|---|---|---|
| 1. GE Inner | 16% | 37% | 17% | 32% |
| 2. GE Southend/S'min | 11% | 17% | 19% | 16% |
| 3. GE Mainline | 14% | 1% | 11% | 4% |
| 4. GE Outer | 19% | 15% | 17% | 16% |
| 5. WA Inner | 12% | 23% | 17% | 21% |
| 6. WA Outer | 14% | 7% | 8% | 8% |
| 7. WA Stansted | 15% | 1% | 12% | 3% |
| Grand Total | 100% | 100% | 100% | 100% |

## APPENDIX B Compare Overall Satisfaction with Punctuality Satisfaction

| Punctuality Satisfaction | 1.GE Inners | 2.GE Southend/S'min | 3.GE Mainline | 4.GE Outer | 5.WA Inner | 6.WA Outer | 7.WA Stansted | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1.Satisfied (Net) | 71% | 79% | 74% | 67% | 73% | 74% | 83% | 73% |
| 2.Neither, Nor | 10% | 12% | 10% | 13% | 11% | 10% | 9% | 11% |
| 3.Dissatisfied (Net) | 19% | 9% | 17% | 20% | 16% | 16% | 8% | 16% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

| Overall Satisfaction | 1.GE Inners | 2.GE Southend/S'min | 3.GE Mainline | 4.GE Outer | 5.WA Inner | 6.WA Outer | 7.WA Stansted | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1.Satisfied (Net) | 72% | 76% | 77% | 68% | 72% | 72% | 75% | 73% |
| 2.Neither, Nor | 16% | 15% | 13% | 17% | 19% | 17% | 15% | 16% |
| 3.Dissatisfied (Net) | 12% | 9% | 10% | 15% | 9% | 11% | 10% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

| Punctuality Satisfaction | Business | Commuter | Leisure | Grand Total |
|---|---|---|---|---|
| 1.Satisfied (Net) | 81% | 67% | 88% | 73% |
| 2.Neither, Nor | 9% | 13% | 4% | 11% |
| 3.Dissatisfied (Net) | 10% | 20% | 7% | 16% |
| Grand Total | 100% | 100% | 100% | 100% |

| Overall Satisfaction | Business | Commuter | Leisure | Grand Total |
|---|---|---|---|---|
| 1.Satisfied (Net) | 82% | 66% | 87% | 73% |
| 2.Neither, Nor | 11% | 20% | 8% | 16% |
| 3.Dissatisfied (Net) | 6% | 14% | 5% | 11% |
| Grand Total | 100% | 100% | 100% | 100% |

## APPENDIX C Satisfaction with Punctuality

| Satisfaction by Journey Purpose | Commute | Business | Leisure | Grand Total |
|---|---|---|---|---|
| 1. SATISFIED (NET) | 66% | 78% | 85% | 71% |
| 2. DISSATISFIED (NET) | 22% | 13% | 7% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 13% | 8% | 7% | 11% |
| Grand Total | 100% | 100% | 100% | 100% |

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| Satisfaction by Gender | FEMALE | MALE | Grand Total |
|---|---|---|---|
| 1. SATISFIED (NET) | 74% | 69% | 71% |
| 2. DISSATISFIED (NET) | 17% | 18% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 9% | 13% | 11% |
| Grand Total | 100% | 100% | 100% |

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| Satisfaction by Employment Type | WORKING FULL TIME | WORKING PART TIME | FULL TIME STUDENT | NOT WORKING | RETIRED | Grand Total |
|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 69% | 77% | 71% | 74% | 80% | 90% |
| 2. DISSATISFIED (NET) | 20% | 13% | 18% | 15% | 13% | 6% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 12% | 10% | 11% | 11% | 7% | 5% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction by Age Group | 16-25 | 26-34 | 35-44 | 45-54 | 55-59 | 60-64 | 65+ | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 69% | 66% | 69% | 70% | 77% | 81% | 88% | 71% |
| 2. DISSATISFIED (NET) | 18% | 22% | 19% | 18% | 14% | 11% | 6% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 13% | 11% | 11% | 12% | 10% | 8% | 6% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction by Day of Week | 1. Monday | 2. Tuesday | 3. Wednesday | 4. Thursday | 5. Friday | 6. Saturday | 7. Sunday | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 69% | 66% | 71% | 68% | 72% | 85% | 86% | 71% |
| 2. DISSATISFIED (NET) | 19% | 23% | 18% | 19% | 16% | 8% | 7% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 12% | 11% | 11% | 12% | 12% | 7% | 7% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction by Time of Day | Weekday before 0900 | Weekday 0900-0959 | Weekday 1000-1559 | Weekday 1600-1859 | Saturday before 1900 | Sunday before 1900 | Any day 1900 or later | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 66% | 73% | 79% | 68% | 85% | 86% | 66% | 71% |
| 2. DISSATISFIED (NET) | 22% | 17% | 13% | 19% | 8% | 7% | 20% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 12% | 10% | 8% | 14% | 7% | 7% | 14% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

| Satisfaction by Dep Hour – Weekdays Only | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 69% | 70% | 61% | 73% | 79% | 74% | 78% | 80% | 88% | 81% | 76% | 67% | 63% | 64% | 66% | 73% | 69% |
| 2. DISSATISFIED (NET) | 22% | 18% | 27% | 17% | 13% | 16% | 13% | 13% | 9% | 11% | 14% | 19% | 22% | 21% | 19% | 14% | 19% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 9% | 12% | 12% | 10% | 9% | 10% | 9% | 7% | 3% | 8% | 11% | 14% | 15% | 14% | 15% | 13% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction by Departure Hour - Weekdays | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| To London | 71% | 71% | 59% | 75% | 87% | 80% | 84% | 78% | 97% | 70% | 95% | 75% | 73% | 59% | 100% | 69% |
| From London | 60% | 73% | 76% | 59% | 84% | 86% | 82% | 82% | 89% | 83% | 75% | 65% | 62% | 65% | 62% | 73% |
| Other | 67% | 68% | 61% | 73% | 76% | 71% | 76% | 80% | 85% | 79% | 72% | 70% | 66% | 62% | 72% | 70% |

.

| Satisfaction over past $3^{1}/_{2}$ years | 2005 Q3 | 2005 Q4 | 2006 Q1 | 2006 Q3 | 2006 Q4 | 2007 Q1 | 2007 Q3 | 2007 Q4 | 2008 Q1 | 2008 Q3 | 2008 Q4 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 74% | 65% | 68% | 72% | 64% | 68% | 76% | 71% | 72% | 79% | 69% | 71% |
| 2. DISSATISFIED (NET) | 16% | 24% | 22% | 16% | 21% | 19% | 15% | 18% | 18% | 11% | 17% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 9% | 11% | 10% | 11% | 14% | 13% | 10% | 11% | 10% | 10% | 14% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction by Month of Survey Date | January | February | March | September | October | November | Grand Total |
|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 65% | 70% | 70% | 75% | 73% | 61% | 71% |
| 2. DISSATISFIED (NET) | 22% | 19% | 19% | 14% | 16% | 25% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 13% | 11% | 11% | 10% | 11% | 14% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction for Destination London | 1. GE Inner | 2. GE Southend/S'min | 3. GE Mainline | 4. GE Outer | 5. WA Inner | 6. WA Outer | 7. WA Stansted | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 73% | 76% | 72% | 68% | 70% | 76% | 90% | 73% |
| 2. DISSATISFIED (NET) | 17% | 10% | 16% | 20% | 20% | 13% | 7% | 16% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 10% | 14% | 11% | 12% | 10% | 11% | 3% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction for Origin London | 1. GE Inner | 2. GE Southend/S'min | 3. GE Mainline | 4. GE Outer | 5. WA Inner | 6. WA Outer | 7. WA Stansted | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 70% | 81% | 68% | 64% | 64% | 68% | 79% | 70% |
| 2. DISSATISFIED (NET) | 21% | 9% | 22% | 23% | 22% | 20% | 13% | 19% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 9% | 10% | 9% | 13% | 14% | 12% | 8% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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| Satisfaction for Origin/Destinantion Not London | 1. GE Inner | 2. GE Southend/S'min | 3. GE Mainline | 4. GE Outer | 5. WA Inner | 6. WA Outer | 7. WA Stansted | 8. Other | Grand Total |
|---|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 75% | 78% | 71% | 67% | 65% | 77% | 81% | 84% | 71% |
| 2. DISSATISFIED (NET) | 14% | 12% | 20% | 21% | 24% | 12% | 14% | 10% | 18% |
| 3. NEITHER SATISFIED NOR DISSATISFIED | 11% | 11% | 9% | 12% | 11% | 10% | 5% | 6% | 11% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

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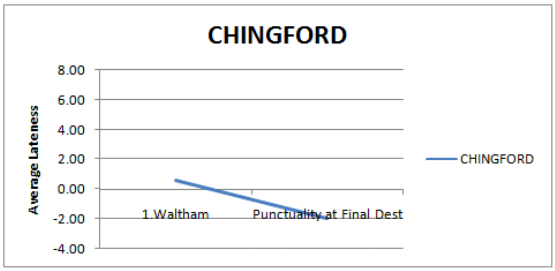
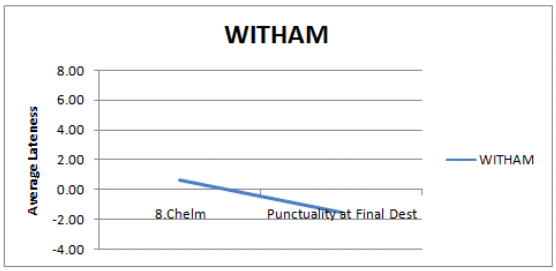
| Satisfaction over past $3^1/_2$ years | 2005 Q3 | 2005 Q4 | 2006 Q1 | 2006 Q3 | 2006 Q4 | 2007 Q1 | 2007 Q3 | 2007 Q4 | 2008 Q1 | 2008 Q3 | 2008 Q4 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. SATISFIED (NET) | 74% | 65% | 68% | 72% | 64% | 68% | 76% | 71% | 72% | 79% | 69% | 71% |
| Weekdays | 72% | 63% | 65% | 71% | 64% | 66% | 74% | 68% | 70% | 78% | 67% | 69% |
| Weekends | 91% | 85% | 87% | 84% | 68% | 87% | 92% | 86% | 83% | 85% | 84% | 85% |
| | | | | | | | | | | | | |
| Weekdays to London | 79% | 59% | 62% | 73% | 65% | 63% | 77% | 73% | 67% | 77% | 70% | 69% |
| Weekdays to London Business | 95% | 67% | 77% | 74% | 82% | 78% | 80% | 94% | 86% | 78% | 81% | 81% |
| Weekdays to London Commuter | 76% | 53% | 60% | 73% | 59% | 61% | 75% | 67% | 63% | 74% | 57% | 65% |
| Weekdays to London Leisure | 92% | 91% | 84% | 81% | 85% | 77% | 89% | 86% | 81% | 87% | 95% | 86% |
| | | | | | | | | | | | | |
| Weekdays from London | 64% | 70% | 71% | 75% | 66% | 71% | 64% | 75% | 67% | 77% | 58% | 69% |
| Weekdays from London Business | 90% | 87% | 72% | 81% | 82% | 88% | 73% | 79% | 79% | 78% | 44% | 80% |
| Weekdays from London Commuter | 56% | 64% | 68% | 70% | 59% | 62% | 60% | 71% | 60% | 74% | 58% | 64% |
| Weekdays from London Leisure | 85% | 76% | 93% | 96% | 100% | 88% | 78% | 92% | 87% | 91% | 56% | 88% |

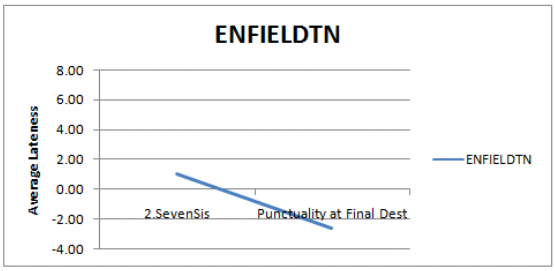
| To London | 2005Q3 | 2005Q4 | 2006Q1 | 2006Q3 | 2006Q4 | 2007Q1 | 2007Q3 | 2007Q4 | 2008Q1 | 2008Q3 | 2008Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GE | 79% | 86% | 70% | 75% | 67% | 62% | 74% | 75% | 64% | 71% | 66% |
| WA | 77% | 44% | 48% | 70% | 62% | 66% | 88% | 68% | 77% | 83% | 79% |
| GE Commuter | 77% | 81% | 69% | 74% | 66% | 59% | 71% | 71% | 61% | 71% | 52% |
| WA Commuter | 68% | 36% | 41% | 70% | 43% | 63% | 86% | 57% | 72% | 78% | 70% |
| GE Leisure | 90% | 81% | 87% | 72% | 80% | 76% | 87% | 83% | 74% | 79% | 93% |
| WA Leisure | 96% | 93% | 79% | 93% | 100% | 80% | 95% | 95% | 90% | 99% | 99% |

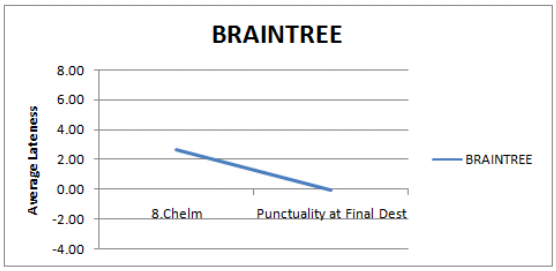
| From London | 2005Q3 | 2005Q4 | 2006Q1 | 2006Q3 | 2006Q4 | 2007Q1 | 2007Q3 | 2007Q4 | 2008Q1 | 2008Q3 | 2008Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GE | 68% | 78% | 71% | 76% | 65% | 69% | 63% | 78% | 58% | 78% | 57% |
| WA | 47% | 51% | 73% | 72% | 70% | 75% | 65% | 72% | 77% | 75% | 70% |
| GE Commuter | 60% | 74% | 68% | 72% | 59% | 62% | 58% | 72% | 45% | 76% | 58% |
| WA Commuter | 36% | 47% | 66% | 48% | 60% | 63% | 62% | 68% | 74% | 72% | 62% |
| GE Leisure | 100% | 84% | 97% | 96% | 100% | 93% | 82% | 91% | 91% | 92% | 48% |
| WA Leisure | 65% | 63% | 90% | 95% | 100% | 80% | 75% | 93% | 85% | 88% | 97% |

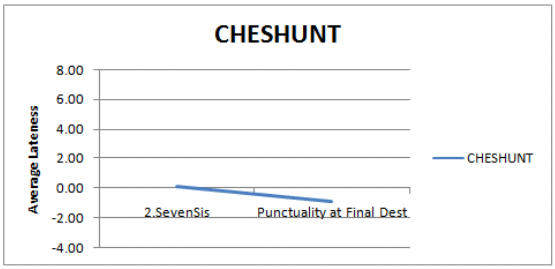
## APPENDIX D Compare Peak Lateness En Route with Final Destination

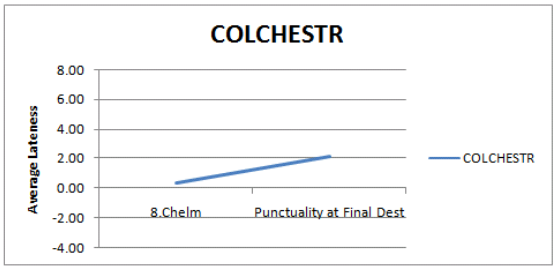


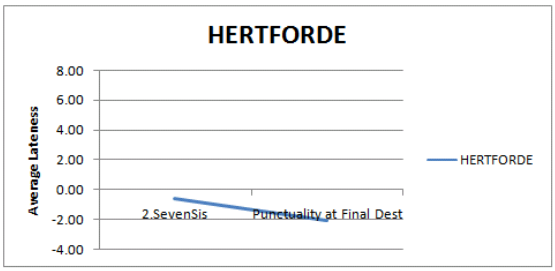



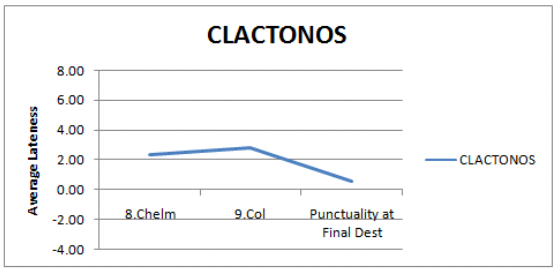



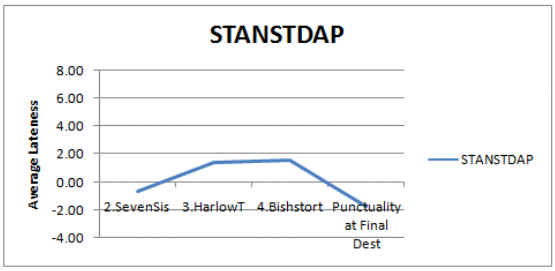



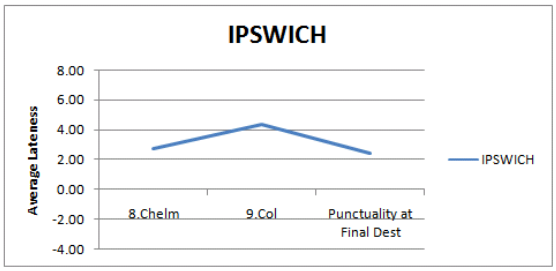



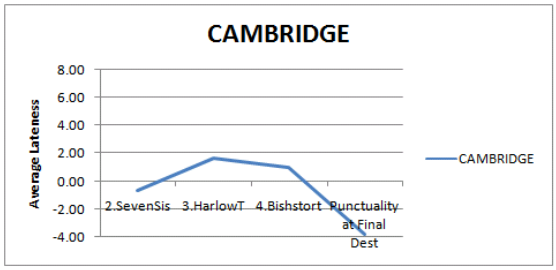



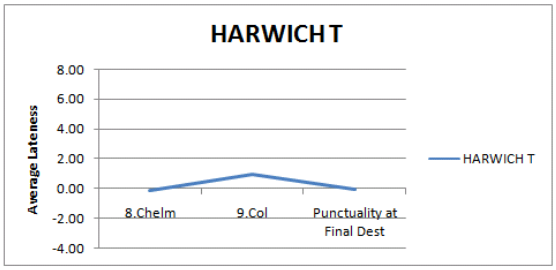



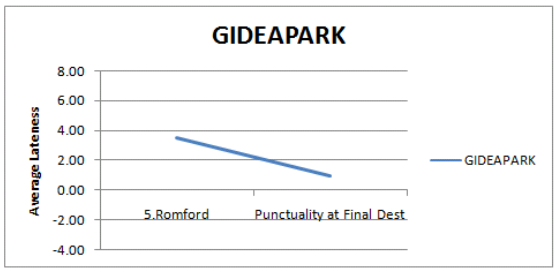



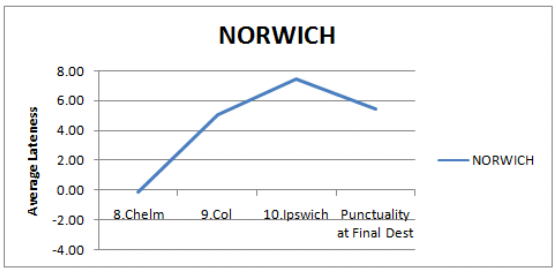



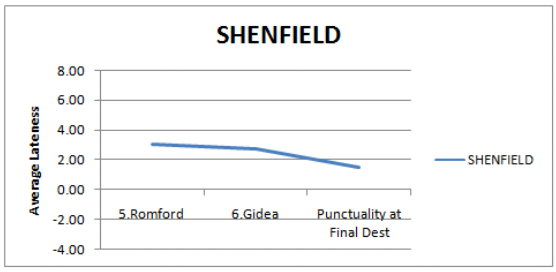



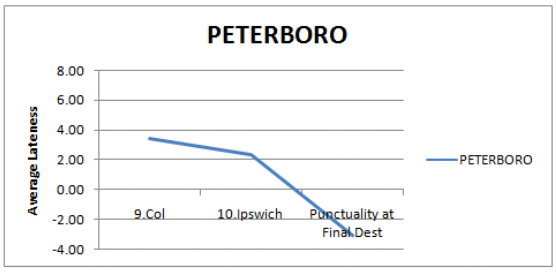

CAMBRIDGE
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
2.SevenSis
3.HarlowT
4.Bishstort
Punctuality at Final Dest
CAMBRIDGE

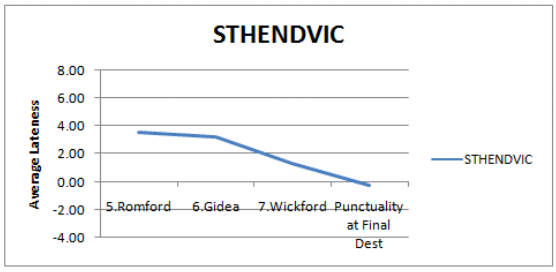

HARWICH T
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
8.Chelm
9.Col
Punctuality at Final Dest
HARWICH T

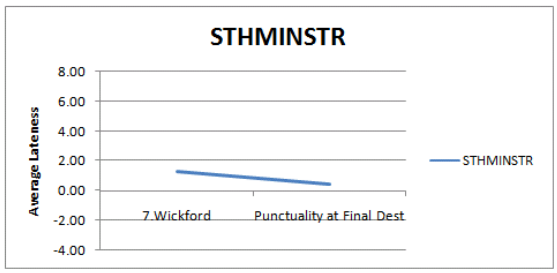

GIDEAPARK
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
5.Romford
Punctuality at Final Dest
GIDEAPARK


NORWICH
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
8.Chelm
9.Col
10.Ipswich
Punctuality at Final Dest
NORWICH

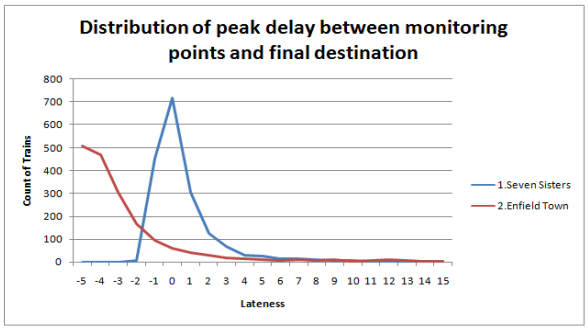

SHENFIELD
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
5.Romford
6.Gidea
Punctuality at Final Dest
SHENFIELD

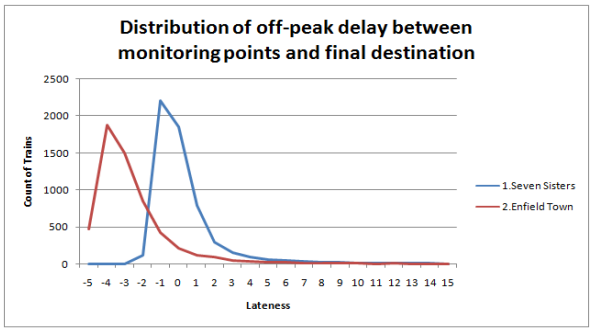

PETERBORO
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
9.Col
10.Ipswich
Punctuality at Final Dest
PETERBORO

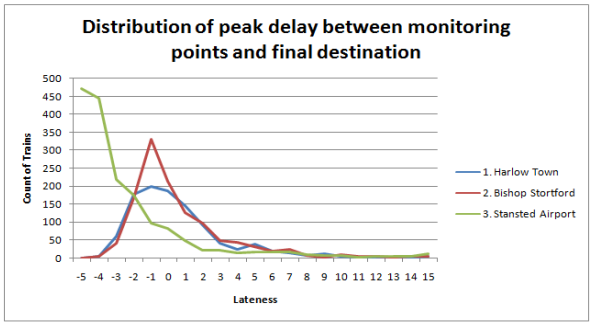

STHENDVIC
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
5.Romford
6.Gidea
7.Wickford
Punctuality at Final Dest
STHENDVIC

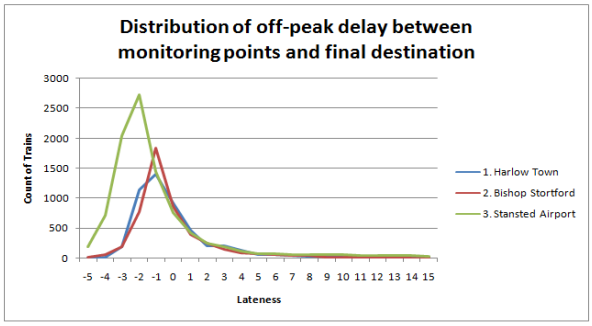

STHMINSTR
Average Lateness
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
7.Wickford
Punctuality at Final Dest
STHMINSTR

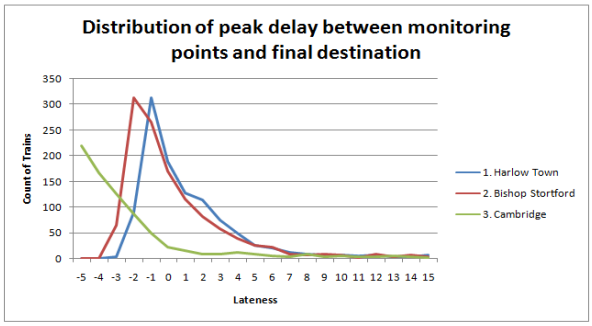
## APPENDIX E Distribution of peak/off-peak delay between monitoring points and final destination

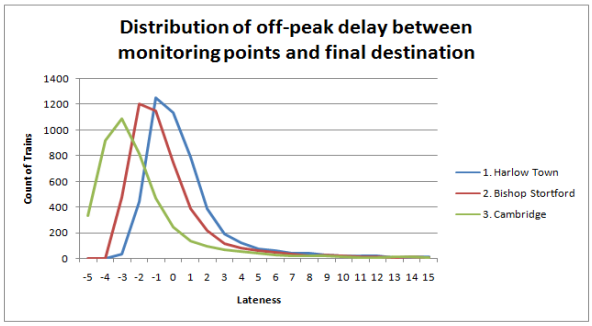


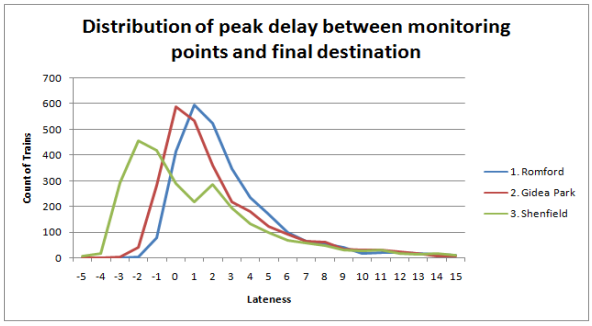



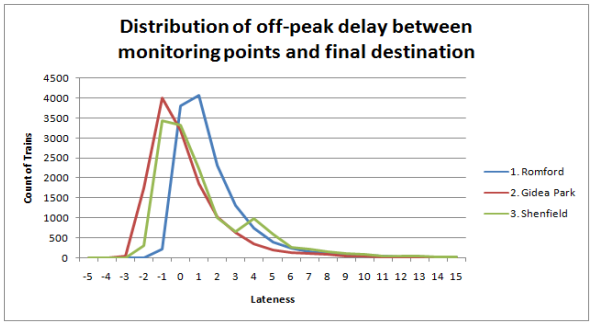



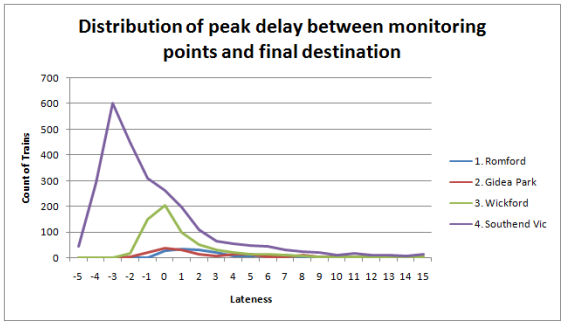



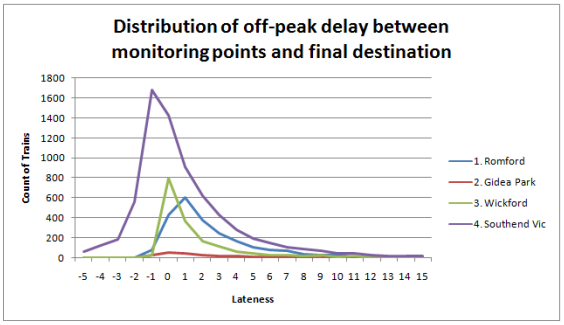



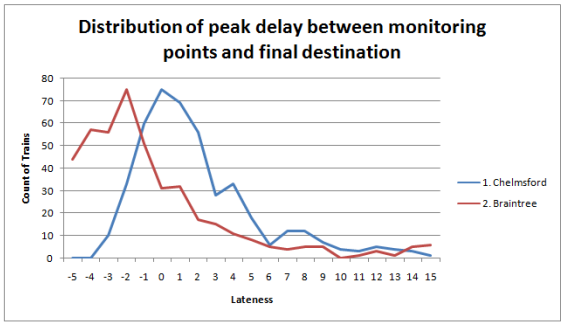



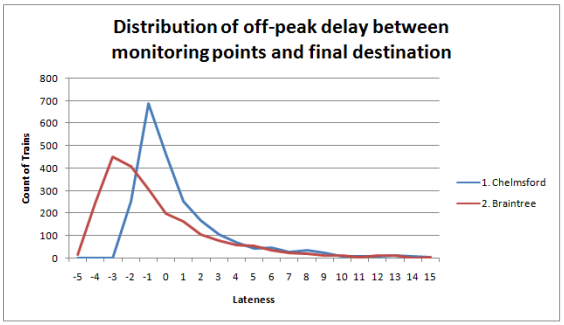



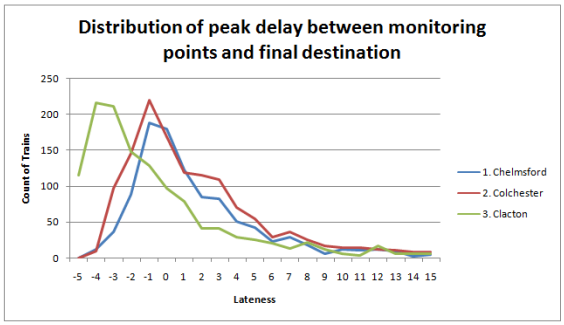



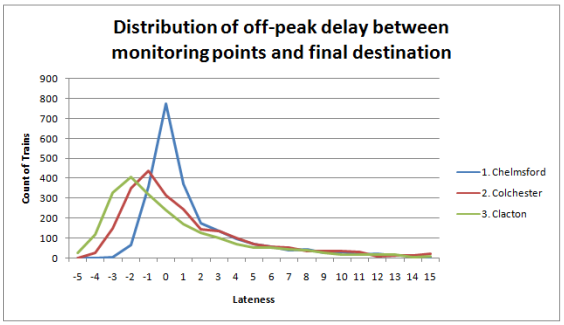

Distribution of peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Romford
2. Gidea Park
3. Wickford
4. Southend Vic

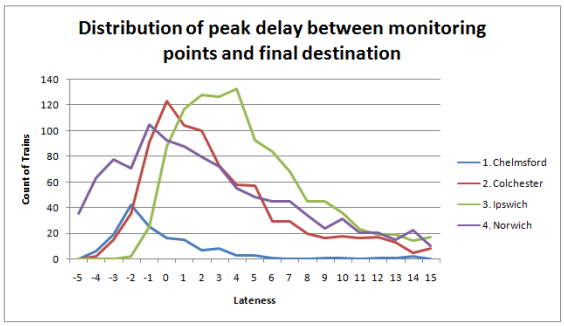

Distribution of off-peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Romford
2. Gidea Park
3. Wickford
4. Southend Vic

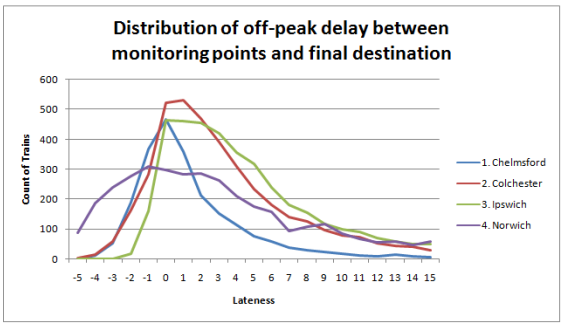

Distribution of peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Chelmsford
2. Braintree


Distribution of off-peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Chelmsford
2. Braintree


Distribution of peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Chelmsford
2. Colchester
3. Clacton


Distribution of off-peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Chelmsford
2. Colchester
3. Clacton


Distribution of peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Chelmsford
2. Colchester
3. Ipswich
4. Norwich


Distribution of off-peak delay between monitoring points and final destination
Count of Trains
Lateness
1. Chelmsford
2. Colchester
3. Ipswich
4. Norwich