Yorcard Research Folder - Phase 3

Open system, second series of observations: Touch On only Folder

RES731 - Page 5 Boarding Time Study

This Folder is the third in a series of six folders and two reports that form the research outputs which complement the Yorcard Smart Ticketing Pilot funded by the Department of Transport, Technology and Standards Division. All folders in this series of six, comprise of a number of discrete and stand alone reports. Each report has been written so it can be read in isolation, giving the reader a detailed view of a specific subject matter or be read in conjunction with other reports in the same folder or other folders. Consequently there is a considerable amount of common information across reports, which the reader, if intending to read more than one report may wish to skip. There are three reports and one data book that make up this folder.

This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

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RES733 - Page 27 Consumer Survey

The complete list of folders are as follows :

RES734 - Page 65 End of Phase Report

Phase 1 General Reference and Baseling

Phase 2 Open system, first observations : Touch On only

Phase 3 Open system, full operational system : Touch On Only

Phase 4 Closed system, Touch On Touch Off

Phase 5 Additional Management data

Phase 6 Citizen Card

Phase 7 Reports: Research Final Report and Best Practice Report

RES803 - Page 83 Data Book Phase 3

RES731 Phase 3: Boarding Time Study

Contents

1.0 Introduction

2.0 Method of Recording Boarding & Dwell Times

3.0 Results & Analysis

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4.0 Summary & Conclusions

5.0 Recommendations

6.0 Appendix 1

Glossary

Alighting Passengers - These are passengers who are getting off the bus. They are also referred to as Alighters in the report.

Alighting Time (1) (A(1)) - Time taken for passengers to alight from the bus (measure from when the first passenger steps off the bus to when the doors close). This is used to measure the Alighting Time for one alighting passenger.

Alighting Time (2) (A(2)) - Time taken for 2 alighting passengers or more to disembark from the bus (measured from when the first passenger steps off the bus to when the last passenger steps off the bus).

Boarding Passengers - These are passengers who are getting onto the bus. They are also referred to as Boarders in the report.

Boarding Time (1) (B(1)) - Time taken for boarding passengers to carry out their boarding transaction with the driver (measured from when the first passenger steps onto the bus to when the doors close). This is used to measure the Boarding Time for one boarding passenger.

Boarding Time (2) (B(2)) - Time taken for 2 boarding passengers or more to carry out their boarding transaction with the driver (measured from when the first passenger steps onto the bus to when the last passenger steps onto the bus).

Bus Stop Boarding/Alighting Time (B/A Time) - Time taken for the driver to operate the doors and to allow passengers to load and alight at the stop (measured in this study from doors opening to doors closing).

Bus Journey Time Total service time between defined points and linked to Pilot Acceptance Criteria 2, Reduced Journey Times

Bus Running Time - Bus Journey Time – Bus Stop Dwell Time

Bus Stop Dead Time - Time at bus stop attributable to operation of doors and pulling in and out of the stop.

Bus Stop Dwell Time (often referred to as Dwell Time in the text) Bus Stop Dead Time + Bus Stop Boarding/Alighting Time + Bus Stop Recovery Time
This is the total time that the bus spends at the bus stop - (measured in this study from the time the bus stops at a bus stop to when bus leaves the bus stop)

Bus Stop Recovery Time - Estimate of time spent at stop for the purposes of adhering to schedule / regulating the service.

Co-efficient (Regression Analysis)
The additional time added to the overall Dwell Time, due to a single transaction of each ticket type

Correlation co-efficient A measure of the strength of the relationship between two sets of data (reported using R-squared values)

Customer Ticket Types
Adult cash: any non-concessionary transaction where cash is handed to the driver including 'swipe and pay' using a smartcard

Child cash: any payment of 40p using a MegaTravel concessionary pass including 'swipe and pay' using a smartcard

Non-cash: any use of a period ticket as a 'flash pass' by an adult or a child with a free child pass

Smartcards: adult or child smartcard use with no payment

Concession: senior and disabled concessions travelling free and either using a 'flash pass' or swiping a smartcard

Flash pass - Passengers who must show their smartcard or paper ticket to the driver to gain access to the service

No Alighting Passengers - Times calculated when no passengers alighted a bus at the stop and there were only boarding passengers

No Boarding Passengers - Times calculated when no passengers boarded a bus at the stop under observation and there were only alighting passengers

No Other Factors - Data, which have Other Factors recorded, removed when calculating Times

Other Factors - Factors observed and noted by the surveyors when collecting the data which may affect the times calculated for this and subsequent phases. These are defined as either scheduling factors, such as driver change over, or passenger factors, such as passengers boarding with a buggy,

Pilot Acceptance Criteria - A number of targets and measurements that have been set prior to the collection of data that will inform business cases and future development of the Yorcard project

Swipe and Pay - Passengers using a smartcard and then paying cash

A diagram explaining the times listed in the glossary above can be found in Appendix 1 (see figure 1).

Measurement Description		Data with other factors	Data without other factors			
		Phase 1	Phase 1	Phase 2	Phase 3	Phase 4
		Mean Time – sec (Standard Deviation)	Mean Time – sec (Standard Deviation)	Mean Time – sec (Standard Deviation)	Mean Time – sec (Standard Deviation)	Mean Time – sec (Standard Deviation
Bus Stop Dwell Time:	per bus	34.25	28.66	40.77	47.00	
		(72.52)	(68.06)	(60.69)	(50.20)	
	per boarding and alighting passenger	8.29	7.08	12.35	7.20	
		(13.67)	(9.98)	(26.69)	(11.66)	
Bus Stop Boarding/ Alighting Time:	per bus	29.29	23.78	33.14	42.90	
		(45.12)	(34.95)	(51.95)	(48.10)	
	per boarding and alighting passenger	6.98	5.76	9.08	5.85	
		(13.01)	(9.22)	(13.33)	(10.30)	
Boarding Time (1) [when only one passenger boards]:	per bus	13.62	10.47	19.81	15.30	
		(30.56)	(23.82)	(36.71)	(36.60)	
	per boarding passenger [no alighting passengers]	11.77	9.51	17.71	11.60	
		(25.59)	(19.21)	(32.07)	(13.30)	
Boarding Time (2) [when 2 or more passengers board]:	per bus	21.91	19.79	25.88	36.10	
		(39.30)	(37.63)	(50.96)	(36.06)	
	per boarding passenger [no alighting passengers]	3.27	2.91	4.90	3.85	
		(4.38)	(2.37)	(6.82)	(3.34)	
Alighting Time (1)1 [when only one passenger alights]:	per bus	11.36	9.34	14.04	28.60	
		(10.30)	(6.32)	(15.65)	(37.28)	
	per alighting passenger [no boarding passengers]	8.97	7.57	4.62	7.75	
		(4.55)	(1.83)	(1.44)	(11.32)	
Alighting Time (2) [when 2 or more passengers board]:	per bus	20.32	18.95	9.00	19.97	
		(12.05)	(10.76)	(10.24)	(10.36)	
	per alighting passenger [no boarding passengers -see section 3.6]	2.65	2.44	1.38	2.70	
		(1.90)	(0.76)	(0.71)	(1.39)	

Table 1. Summary of the boarding/alighting/bus dwell times

Executive Summary

The Yorcard Project is intended to deliver a multi-modal, multi-operator public transport smartcard scheme to be trialled on certain buses in Sheffield and on the local train service between Sheffield and Doncaster and intermediate stations.

This report presents the findings from the Phase 3 Boarding Time Study, the purpose of which is to demonstrate that an off-bus ticket type survey methodology will allow for a regression analysis to be conducted using different ticket types to explain dwell times. The original methodology has been developed further as the initial method for collection of ticket type data did not provide the depth of information anticipated and required for a meaningful regression. Boarding Time, in particular the impact of smartcards on boarding times is a key element of the stakeholder business cases and could help shape the development of many parts of the Yorcard project.

This study has determined a baseline ticket type regression to compare and contrast with the results from other Phases of this research project. It has also carried out rigorous statistical analyses to ensure that the data collected can be said to come from the same general population of bus users as the Phase 1 study, allowing for comparisons between the baseline and future Phases to be made with confidence. This report documents these results and demonstrates the impact of this work upon the Yorcard and Department for Transport (DfT) objectives, and the final business case.

Total		Boarding Passengers	Alighting Passengers	Buses Observed
With other factors	Phase 1	2,944	2,936	1,049
Without other factors	Phase 1	2,625	2,640	965
	Phase 2	2,500	3,086	1,212
	Phase 3	3,698	3,790	936

Introduction

Phase 1 of this programme developed, tested and then used an off-bus method for recording boarding and dwell times using a stopwatch. Document YC-IGO-RES006 draft G was approved by the Yorcard Working Group and it detailed the methodology employed for this task.

The Phase 1 Boarding Time Report (YC-IGO-RES-711) has been completed and approved, with the exception of ticket type evaluation. The report highlighted that the data collected as part of the Phase 1 study projected a robust baseline in order to understand changes in future associated with the ticketing regime of the Yorcard project. However, further analyses of the ticket type data provided by the participating bus operators has not allowed for a valid regression analysis to be performed. As a result, the methodology has been developed to enable the recording of the required ticket types during the data collection and therefore, this methodology must be used to provide a baseline for the ticket type analysis.

This report documents the analysis of the data collected using this methodology and creates a baseline of the impact of ticket types on Dwell Time. This will facilitate the study of the impact that the introduction of smartcards has during the later phases of this pilot.

Method of Recording Boarding & Dwell Times

Full details of the methodology employed and the reasoning behind decisions made are documented in the Ticket Type Control Group Study (YC-IGO-RES-017). As the pilot is already underway, the data collection for this study took place at bus stops outside of the pilot route (see Appendix 1 for details of the bus stops chosen).

The methodology reported in the above document was adopted by Phase 2 and as a result a number of changes were proposed in the Phase 2 Boarding Time Report (YC-IGO-RES-721). It was recommended that reducing the number of ticket types collected by the third surveyor would improve the accuracy of the ticket type data collected and increase the robustness of regression. Also, as this is a baseline study, data collection of smartcards is not required in this study. Apart from the change to the ticket type data the third surveyor collects, the methodology remains identical to Phase 2. Each surveyor collects the following information:

1st Surveyor:

- Start the stopwatch when the bus has come to a halt
- Press the lap counter when the doors are open
- Press the lap counter when the first passenger boards the bus
- Press the lap counter when the last passenger boards the bus
- Press the lap counter when the doors close
- Press the lap counter when the bus departs
- Record each time in a matrix and reset the stopwatch

2nd Surveyor:

- Start the stopwatch when the bus has come to a halt
- Press the lap counter when the doors are open
- Press the lap counter when the first passenger alights the bus
- Press the lap counter when the last passenger alights the bus
- Press the lap counter when the doors close
- Press the lap counter when the bus departs
- Record each time in a matrix and reset the stopwatch
- Record the number of passenger alighting

3rd Surveyor:

- Record details of the boarding/ alighting event including:

- Bus ID
- Time of observation
- Day of week
- Operator
- Route number
- Vehicle Type
- Ticket type as:
  Adult/Cash;
  Child/Cash; and
  Flash pass

In Phases 2 and 4, the ticket type also includes smartcards.

Results & Analysis

3.1 Summary of Analysis

The results presented in this section are, firstly, the ticket type regression, followed by the statistical analysis of the data collected which has been carried out to ensure that the sample is similar to that which has been collected in Phase 1 on the pilot corridor.

3.2 Sample Size

The data collection for this Phase 3 Boarding Time Study was carried out over a period of approximately 7 days in early January 2009. The bus stops chosen for the Study were not the same as, but equivalent to, those used on the pilot corridor so as to establish a baseline split of Boarding Times for different ticket types. This has not affected the number of boarding and alighting passengers required to meet the sample size stated in the methodology as both figures have been greatly surpassed. All the data required for this report have now been collected, entered into a database and cleaned for data coding errors, inconsistencies and missing information. This cleaning process resulted in 5% (48 observations) of data being rejected.

Data have been collected from 999 buses at 16 bus stops in a variety of locations from inner city to suburbs along a corridor of frequent bus routes in Sheffield (please see Appendix 1 for the list of bus stops and an overview of their locations). Among the 999 observed buses, 63 were noted with Other Factors by the surveyors and, therefore, were excluded from the analyses that follow. This information accounts for 3,698 boarding passengers and 3,790 alighting passengers collected during the following times and days (see Table 2):

	Boarding	Alighting
Mon-Fri 07:30-09:30	587	549
Mon-Fri 10:00-13:00	725	755
Mon-Fri 15:00-18:00	1,082	705
Weekends	1,304	1,781
TOTAL	3,698	3,790

Table 2: Summary of the number of boarding/alighting passengers observed

3.3 Ticket Type Regression Analysis

The Proof of Concept Report[1] demonstrated how regression analysis (Ordinary Least Squares) could be successfully applied to explain dwell times based upon individual ticket type data. The Proof of Concept used data from a previous study to show that such an approach can also be applied to the Yorcard scheme. It is, therefore, important to follow this methodology with Phase 3 Boarding Time Study data collected and presented in this report.

The individual ticket types collected for Phase 3 Boarding Time Study and used in the regression analysis were as follows:

- Adult Cash;
- Child Cash; and
- Flash Pass (including Concessionary and pre-paid period tickets);

As the individual ticket types are primarily associated with the boarding time, it was important to include 'alighting passengers' and 'vehicle types' in the regression analysis as these are additional variables which could have an effect on the overall Dwell Time.

The regression analysis using this individual ticket data generated a statistically significant result, with all variable co-efficients (additional time added to the overall dwell time, due to a single transaction of each ticket type) being significant at the 5% level. The resulting regression equation is as follows:

Dwell Time (seconds) = 13.7 + (7.15 Adult Cash) + (2.79 Child Cash) + (4.19 Flash Pass) + (1.98 Alighting Passengers) + (8.97 Vehicle Type 'D')

The result of the regression analysis suggests that from the observed sample of passengers, if all other variables (for example, each individual ticket type, alighting time, bus stop dead time and recovery time) remain constant, an extra transaction for each ticket type would increase the boarding time by the following (see Table 3):

Ticket Type	Boarding Time Per Passenger (seconds)
Adult Cash	7.15
Child Cash	2.79
Flash Pass	4.19

Table 3: Results of Regression Analysis for each Ticket Type

The regression analysis is based upon 1240 individual 'Adult Cash' transactions, 265 'Child Cash' transactions and 2193 'Flash Pass' tickets, so the final figures can be said to be based upon a representative sample of bus users in this Study, and therefore the findings are robust.

Although the co-efficient for the 'Adult Cash' variable is not identical to that found in the regression analysis from Phase 2 (8.51 seconds), the difference in the co-efficients between the phases is small (1.36 seconds) and both times can be said to be of a sensible order of magnitude.

For this Phase, 'Flash Pass' tickets were defined to be a combination of the pre-paid passes (non-cash) and concessionary tickets collected in the Phase 2 surveys. As the Phase 3 co-efficient for 'Flash Pass' tickets falls within the limits defined by the co-efficients of the two individual ticket types from Phase 2 (range: 2.93 seconds to 7.27 seconds) it can also be said that the results of this Phase 3 regression analysis are sensible. It may well reflect in part that concessions (i.e. elderly and disabled passengers) take longer to complete the boarding process than those pre-paid ticket holders.

The co-efficient for the 'Child Cash' tickets is perhaps not as sensible as that found in Phase 2. The relative low figure is primarily due to a large number of individual observations (n = 821) where there were no 'Child Cash' transactions. With a substantial number of zero 'Child Cash' tickets, there is lower variation within this particular variable of the whole dataset by which the regression analysis is attempting to explain the overall variation in dwell times. This high number of observations with zero 'Child Cash' tickets combined with the relatively small number of 'Child Cash' transactions contributes towards the lower value for the 'Child Cash' co-efficient.

[1] *Phase 1: Proof of Concept. Explanation of dwell time by ticket type using OLS Regression, Version 1, January 2008.*

The analysis suggests that every alighting passenger adds 1.98 seconds onto the overall dwell time. It also indicates that there is a statistically significant difference between the vehicle types, as double deck vehicles add 8.97 seconds onto the overall dwell time compared to single deck vehicles, which is also significant to the general operation of the bus services. Possible reasons for this difference could be due to there being greater seating capacity on the upper deck and so more passengers have to climb the stairs, thus increasing the overall boarding time. The increased capacity of double deck vehicles may also result in more interactions between boarding and alighting passengers, which may also have an impact on the overall boarding times. Further analysis is required in Phase 4.

27.5% of the variation in the dwell time is explained by the variables used in this regression analysis (having adjusted for the number of degrees of freedom). Although 27.5% may seem to be a relatively low figure, it is consistent with the findings from Phase 2 where the variables used for the regression explained 30% of the variation in dwell time.

There is great variation within the actual dwell times (standard deviation = 50.19 seconds) as shown by Figure 2. A correlation co-efficient (R-squared value on the graph, a measure of the strength of the relation between two sets of data) of 0.2196 indicates a weak positive relationship between dwell time and the number of boarding/alighting passengers. A box-plot analysis of the dwell times indicates that any observations with a dwell time greater than 120 seconds could be considered to be an outlier (those points to the right of the red line in Figure 2), however this does not take into account for those observations where there were a high number of boarders and/or alighters, where a higher dwell time is perhaps to be expected.

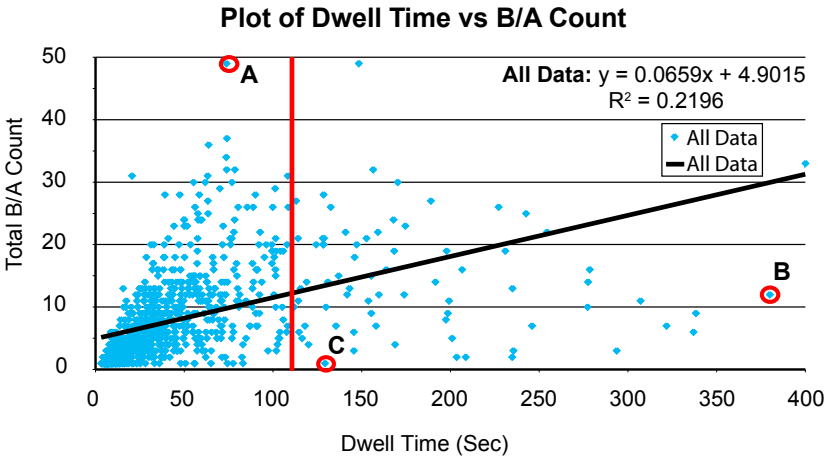


Figure 2 - Plot of Dwell Time and the Number of Boarding and Alighting Passengers

3.4 Data Comparison between Phase 1 & Phase 3

Looking at some of the more extreme values (those circled in Figure 2) highlights how variable the data actually are:

- Point A has a dwell time of 73.76 seconds, with 5 boarders and 44 alighters;
- Point B has a dwell time of 380.04 seconds yet only 3 boarders and 9 alighters; and
- Point C has a dwell time of 129.25 seconds yet only 1 passenger boarded who had a 'flash pass'.

Whether these extreme examples are due to other variables is unclear as no note was included during the survey, therefore these particular observations cannot be discounted without good reason, and a similar case can be made for the other outliers.

As only 27.5% of the dwell time is being explained, other variables such as the time of day (AM, PM or off-peak), or the weather conditions may also have a contributing factor to the overall dwell time, but further analysis shows that including the time of day does not substantially improve the regression equation. Nevertheless, an F-test demonstrates that this is significantly different from 0 and so the regression equation used is therefore explaining the variation in the times based upon the variables used.

Overall, the regression analysis has shown that the ticket type data (and other variables) can be used in predicting the overall dwell time. In future phases, regression analysis can be used to measure and monitor the impacts of smartcards on ticketing procedures and the associated impacts on operational performance.

This section will look at each of the key Dwell Time components as identified in the Phase 1 Boarding Time Study. Twelve 2-sample t-tests were carried out to examine if there were any statistically significant differences between the sample collected for the Phase 3 Study and that for Phase 1.

3.4.1 Bus Stop Dwell Time

Null hypothesis 1: the Bus Stop Dwell Time per bus of Phase 3 does not differ from the Dwell Time of Phase 1.

The statistical results indicate that the mean Dwell Time per bus of Phase 3 is significantly higher than that in Phase 1 at a 5% level (p=0.000, see Table 4). The time was increased by 18.34 sec. As highlighted by the surveyors as well as the data, the bus stops used for the Phase 3 were much busier than those used on the Yorcard pilot corridor. In Phase 3, the average number of boarding/alighting passengers per bus was 8 whilst in Phase 1, the respective number was 5. This suggests that the increase in passenger numbers is one of the contributing factors to the increase in Dwell Time for the Phase 3.

Null hypothesis 2: the Dwell Time per passenger of Phase 3 does not differ from that of Phase 1.

The statistical results indicate that the mean Dwell Time per passenger of Phase 3 is not significantly different from that in Phase 1 at the 5% level (p=0.744, see Table 4). Hence, it confirms that the increase in Dwell Time per bus is mainly caused by more passengers boarding/alighting as the average time of passenger boarding/alighting is not different.

3.4.2 Bus Stop Boarding/Alighting Time

Null hypothesis 3: the Bus Stop Boarding/Alighting Time (B/A time) per bus of Phase 3 does not differ from that of Phase 1.

The statistical results indicate that the mean B/A time per bus of Phase 3 is significantly higher than that in Phase 1 at a 5% level (p=0.000, see Table 4). The B/A time increased by 19.12 sec, which is 0.78sec higher than the increase in Dwell Time (18.34 sec). It is possible that, because more passengers were boarding/alighting, drivers tried to minimise dead time so that they could stay on schedule.

Null hypothesis 4: the B/A time per passenger of Phase 3 does not differ from that of Phase 1.

The statistical results indicate that the mean B/A time per passenger of Phase 3 is not significantly different from that in Phase 1 at the 5% level (p=0.809, see Table 4). Once again, this confirms that more passengers boarding/alighting had caused the longer B/A time per bus as the average time of each passenger boarding/alighting is the same.

3.4.3 Boarding Time

Null hypothesis 5: the Boarding Time (1) [B(1)] per bus of Phase 3 does not differ from that of Phase 1.

When there was only 1 boarder, the average number of passengers alighting per bus was 3.4 in Phase 3 whilst in Phase 1, the respective number was 2.6. However, the statistical results indicate that the mean B(1) per bus of Phase 3 does not significantly differ from that in Phase 1 at a 5% level (p=0.102, see Table 4). The 0.8 number of passenger alighting did not cause any significant difference between B(1) per bus in both surveys.

Null hypothesis 6: the B(1) per passenger (no alighting passengers) of Phase 3 does not differ from that of Phase 1.

The statistical results indicate that the mean B(1) per passenger (no alighting passengers) of Phase 3 does not significantly differ from that in Phase 1 at the 5% level (p=0.096, see Table 4). This further confirms that when there was only 1 passenger boarding, the average boarding time is not different.

Null hypothesis 7: the Boarding Time (2) [B(2)] per bus of Phase 3 does not differ from B(2) of Phase 1.

When there was more than 1 passenger boarding, the average number of passengers boarding per bus was 5.9 and alighting per bus was 4.4 for Phase 3. The respective numbers in Phase 1 were 5.3 boarders and 1.9 alighters, which suggests overall there were 3 more passengers boarding and/or alighting. The statistical results indicate that the mean B(2) time per bus of Phase 3 is significantly higher than that of Phase 1 at a 5% level (p=0.007, see Table 4). The time increased by 16.31 sec which is 2.81 sec less than the increase in B/A time per bus.

Null hypothesis 8: the Boarding Time (2) [B(2)] per passenger (no alighting passengers) of Phase 3 does not differ from that of Phase 1.

The statistical results indicate that the mean B(2) per passenger (no alighting passengers) of Phase 3 is significantly higher than that in Phase 1 at the 5% level (p=0.001, see Table 4). The time increased by 0.94 sec which may be due to passenger interaction that had slowed down passenger boarding.

3.4.4 Alighting Time

Null hypothesis 9: the Alighting Time (1) [A(1)] per bus of Phase 3 does not differ from that of Phase 1.

When there was only 1 passenger alighting, the average number of passengers boarding was 3.4 in Phase 3 whilst in Phase 1, the respective number was 0.8 which suggests there was 2.6 more passenger boarding. The statistical results indicate that the mean A(1) per bus in Phase 3 is significantly higher than that in Phase 1 at the 5% level (p=0.002, see Table 4). The A(1) time increased by 19.26 sec, which is almost the same as the increase in B/A Time (19.12 sec).

Null hypothesis 10: the Alighting Time (1) [A(1)] per passenger (no boarding passenger) of Phase 3 does not differ from that of Phase 1.

The statistical results indicate that the mean A(1) per passenger (no boarding passengers) of Phase 3 is not significantly different from that in Phase 1 at the 5% level (p=0.364, see Table 4).

Null hypothesis 11: the Alighting Time (2) [A(2)] per bus of Phase 3 does not differ from that of Phase 1.

When there was more than 1 passenger alighting, the average number of passengers alighting per bus was 6.7 and boarding per bus was 4.0 for Phase 3. The respective numbers in Phase 1 were 8.3 alighters and 1.2 boarders, which suggests overall there was 1 more passenger boarding and/or alighting. The statistical results indicate that the mean A(2) per bus in Phase 3 does not significantly differ from that in Phase 1 at the 5% level (p=0.213, see Table 4).

Null hypothesis 12: the Alighting Time (2) [A(2)] per passenger (no boarding passenger) of Phase 3 does not differ from that of Phase 1.

The statistical results indicate that the mean A(2) per passenger (no boarding passengers) in Phase 3 is significantly different from that in Phase 1 at the 5% level (p=0.000, see Table 4). However, the A(2) time only increased by 0.26 sec which is not significant in operation.

Two-Sample t-tests	Mean difference between Phase 3 and Phase 1*	P-Value
1. Dwell Time per bus	18.34 sec	P=0.000**
2. Dwell Time per passenger	-	P=0.744
3. B/A Time per bus	19.12 sec	P=0.000**
4. B/A Time per passenger	-	P=0.809
5. B(1) per bus	-	P=0.102
6. B(1) per passenger (no passengers alighting)	-	P=0.096
7. B(2) per bus	16.31 sec	P=0.007**
8. B(2) per passenger (no passengers alighting)	0.94 sec	P=0.001**
9. A(1) per bus	19.26 sec	P=0.002**
10. A(1) per passenger (no passengers boarding)	-	P=0.364
11. A(2) per bus	-	P=0.213
12. A(2) per passenger (no passengers boarding)	0.26 sec	P=0.000**

Table 4: The summary of hypothesis tests.
**Mean difference is given only when it is statically significant.*
***Mean difference is statistically significant at the 5% level.*

3.4.5 Summary

Overall, the two-sample t-tests suggest that the two sets of data are from similar populations of bus users, although it is noted that the users themselves and their socio-economic groups may be different. It must also be noted that:

- the bus stops used in Phase 3 were much busier than those used in Yorcard pilot corridor;
- the busier stops used in Phase 3 meant that the overall bus Dwell Times were higher than in Phase 1; and
- generally, tests suggested that there was limited statistical difference in boarding and alighting times per passenger.

A summary of the results can be found in Table 4.

Summary & Conclusions

When the Phase 3 Boarding Time Study was scheduled, the Yorcard project had already entered Phase 2, therefore, equivalent bus stops outside the Yorcard pilot corridor were used as a control for the data collection in this Study to ensure independent data were collected for each survey (see Appendix 2 for details).

The ticket type data collected in Phase 3 enabled a ticket type regression analysis to be carried out. This has helped to explain the variation within the Dwell Time to some extent although there are potentially numerous other variables which can have also an impact upon Dwell Time (for example the surrounding traffic conditions at each bus stop). However, whilst the inclusion of additional variables in a regression analysis can increase the R-squared value, it also 'dilute' the influence of the variables of interest, and therefore the variables used in this Phase were kept to a minimum to ensure a robust analysis could be undertaken.

As shown in Figure 2, there is great variation in the Dwell Times (standard deviation = 50.19 seconds) and thus a weak positive relationship between Dwell Time and the number of boarding/alighting passengers (correlation co-efficient=0.2196). Overall, the regression analysis has shown that the ticket type data (and other variables) can be used in predicting the Dwell Time although it must be acknowledged that as only 27.5% of the variation is explained, there are some other variables involved which have not been measured in this survey. However, the regression analysis using these variables has been shown to be a valid one, and can therefore be used to measure and monitor the impacts of smartcards on ticketing procedures and the associated impacts on operational performance.

The results and methods presented in the regression analysis chapter are intended to be used as a baseline for future phases; therefore, 12 two-sample t-tests were carried out to examine whether the data collected in Phase 3 was from the same population of bus users as those collected in Phase 1. The statistical results suggest that the two sets of data were collected from similar populations of bus users. Therefore, this regression analysis can be used with confidence as the baseline for the evaluation of changes in Boarding and Dwell times relative to ticket type.

4.1 Limitations

- Because the pilot was underway when the Phase 3 data collection was scheduled, the data were collected at equivalent bus stops outside the pilot corridor as far as possible. This resulted in an increase in Dwell Time as some of the stops were much busier. However, the data analysis has shown that the data collected for Phase 3 is from similar populations of bus users in Phase1 and, therefore, has had no detrimental effect on the overall project.
- Three ticket types were used in the Phase 3 Study based on recommendations from Phase 2. Although this is less than was stated in the phase methodology plan, this allowed for a more robust regression analysis to be conducted and a reliable baseline to be established. The introduction of smartcard in future Phases will require an additional ticket type factor to be included in the regression analysis.

4.2 Objectives

This study has met the criteria of the agreed methodology having accounted for recommendations in earlier reports. The key objective of this study was to demonstrate that an off-bus ticket type survey methodology will allow for a regression analysis to be conducted using different ticket types in order to explain changes in dwell time. As this relies on two separate sets of data, it was important to demonstrate that both data sets were from the same population of bus users. Both objectives have been met and so this Phase 3 Study can be said to support the findings from Phase 1 in meeting the wider objectives of Yorcard and DfT (as described in Phase 1). The impact on DfT and Yorcard objectives will be assessed when this baseline is compared to the equivalent data sets in future Phases.

Recommendations

This section outlines the recommendations for subsequent phases:

- The methodology outlined in this report will be repeated for Phase 4.
- With the introduction of smartcard, it is recommended that 3 equivalent smart-ticket types (smart adult cash, smart child cash and smart flash pass) should be recorded in conjunction with the ticket types used in Phase 3 as this will allow for any potential impact of the smartcard to be identified in detail. . Keeping the number of ticket types collected by the surveyors to a minimum will keep their tasks manageable, therefore, ensuring the data are robust.
- Further analysis of the impact of Boarding Times is required in Phase 4 with respect to double deck vehicles.

Appendix 1

Appendix 1 – Defining the Control Data Area

Whilst it is not possible to completely replicate the pilot route sample, it was possible to re-establish a baseline based on the pilot area characteristics. To record data for the pilot routes, the following characteristics applied:

- Competition along the line of route(s) between First and Stagecoach.
- High frequency commercial routes.
- A tendered services schools bus operator.
- A mix of urban and suburban areas.
- Hospital.
- University.
- Secondary school.
- In Sheffield.

The area that appeared to best meet the above characteristics was north-east Sheffield. A comparison of the characteristics of the pilot area and control area is provided in the table below:

Although the S4/S5 area is does not have a university[2], it is the only area within Sheffield (S10 aside) that has a hospital. Moreover, it equally has as frequent routes between the city centre and the Northern General hospital than any other area in Sheffield could provide. This would serve to ensure that a sample size relative to Phase 1, and other phases, can be maintained. Suggested locations for data collection, compared to Phase 1, are shown at Appendix 1. It is also important to note that using these routes should realise a similar usage of the different ticket types to that of pilot routes.

Characteristic	Pilot Area (Phase 1)	Control Area
Routes	First 40, 41, 42, 51, 52	First 1, 2, 20, 47, 48, 75, 76, 97, 98
	Stagecoach 52, 120	Stagecoach 29, 83, 88, 265
Frequency	Key routes operate at 10-15 minute frequencies Mon-Sat day time	Key routes operate at 10-15 minute frequencies Mon-Sat day time
Schools operator	Mass Brightbus	Provided by high frequency commercial routes
Urban/Suburban	Lodge Moor/Fulwood	Firth Park/Shiregreen
Hospital	Royal Hallamshire and Children's hospitals	Northern General
University	University of Sheffield	-
Secondary Schools	Notre Dame, King Edward and Tapton	Fir Vale and Firth Park
Sheffield area	S10	S4, S5

[2]*No other area in Sheffield would meet this criteria*

Phase 1			Control Area		
Bus Stop Locations	Description of Location	Direction of Travel	Bus Stop Locations	Description of Location	Direction of Travel
Crimicar Lane / Castlewood Road	Suburbs	Eastbound	Moonshine Lane	Suburbs	Southbound
Crookes Road / Lydgate Lane	University	Eastbound	No equivalent		
Fulwood Road / Notre Dame School	School	Westbound	Barnsley Road/ Longley Lane	School	Northbound
Fulwood Road / Ranmoor Park Lane	School	Eastbound	Barnsley Road/ Longley Lane	School	Southbound
Glossop Road / Clarkehouse Road	Hospital	Eastbound	Herries Road/ Norwood Road	Hospital	Southbound
Glossop Road / Hallamshire Hospital	Hospital	Eastbound	Barnsley Road/ Horndean Road	Hospital	Southbound
Glossop Road / Hallamshire Hospital	Hospital	Westbound	Barnsley Road/ Horndean Road	Hospital	Northbound
Leopold Street / Town Hall	City Centre	Eastbound	Cathedral/City Hall	City Centre	Northbound
Northfield Road / Eastfield Road (Northfield Av)	Suburbs	Eastbound	Bellhouse Road	Suburbs	Southbound
Parkside Road/ Middlewood	Suburbs	Eastbound	Shiregreen	Suburbs	Southbound
Salt Box Lane / Main Street	Suburbs	Eastbound	No equivalent		
Sheffield City centre, Church Street	City Centre	Westbound	Castle Square	City Centre	Northbound
Sheffield Interchange	City Centre Bus station	Westbound	Sheffield Interchange	City Centre Bus station	Northbound
Sheffield, Flat Street	City Centre	Westbound	Sheffield, Flat Street	City Centre	Northbound
West Street / Rockingham Street	City Centre	Westbound	Fitzalan Square	City Centre	Northbound
Western Bank Brook / Favelle Road	University	Westbound	Firth Park School	School	Southbound
Western Bank Brook / Sheffield University	University and Hospital	Westbound	Firth Park School	School	Northbound
Whitham Road / Broomhill	Outskirts of city centre	Eastbound	Burngreave	Outskirts of city centre	Southbound

Note: northbound/westbound – away from city centre, southbound/eastbound – towards city centre

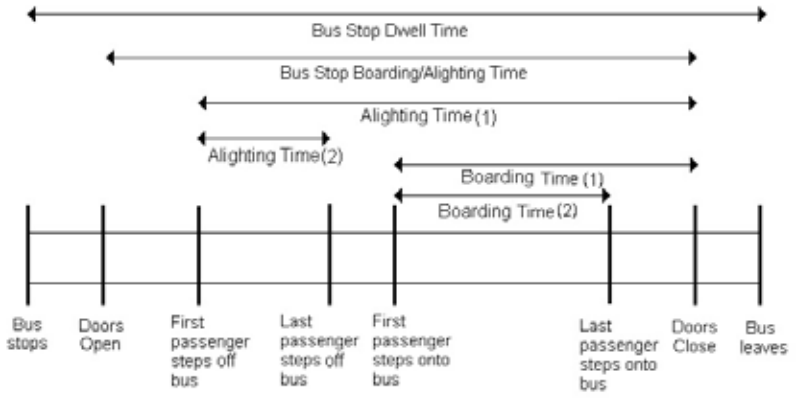


Figure 1: Diagram of Bus Dwell Time components measured in this report (see Glossary for all definitions)

RES733 Phase 3: Consumer Survey

Contents

1.0 Introduction

2.0 Methodology

3.0 Results

This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

4.0 Summary and Conclusions

5.0 Recommendations

6.0 Appendices

Glossary

Bus-user - A participant who predominantly uses bus transport

Non-User - A participant who is neither a predominant bus or train user

On-street Questionnaire
- Questionnaires carried out on-street at a variety of locations in Sheffield along the pilot corridor routes. These questionnaires were carried out as interviews. These participants are referred to non-Yorcard users throughout the report.

Phase 1 - A part of the research programme that ascertained the baseline of primary data

Pilot Acceptance Criteria - A number of targets and measurements that have been set prior to the collection of data that will inform business cases and future development of the Yorcard project

Postal Questionnaire -
Questionnaires sent through the post to targeted Yorcard users. These participants are referred to as Yorcard users throughout the report

Statistically Significant - The data is tested in SPSS to determine if there is a difference between different participant profile opinions. If there is, it must be a statistically significant difference and must have a p-value of less than 0.05 (p-values are reported in the text in brackets).

Train-user - A participant who predominantly uses train transport

Yorcard users - Yorcard users are categorised into 3 age groups:
- 16 and under - free and 40p MegaTravel concessions;
- 17 to 59 – staff, concessions and registered/commercial users;
- 60 and over are ENCTS pass holders in the pilot area

Yorcard Working Group - A group of bus and train operator and PTE representatives in place to oversee the production of research outputs ensuring quality and adherence to data sharing requirements

Executive Summary

The Yorcard Project is intended to deliver a multi-modal, multi-operator Public Transport smartcard scheme to be trialled on a certain corridor of buses in Sheffield and on the local train service between Sheffield, Doncaster and intermediate stations.

This report presents the findings from the Phase 3 Consumer Survey. The aim was to understand non-Yorcard users' (including Public Transport users and non-Public Transport users) and Yorcard users' view on the existing ticketing regimes, how and why people buy certain tickets and overall their appeal of Public Transport (in this case bus and train). On-street one-to-one interviews in Sheffield were used to capture opinions from non-Yorcard users and postal questionnaires were used to capture views from Yorcard users. The sample size collected was in accordance with the methodology defined in YC-IGO-RES-305.

This report demonstrates that the methodology and the data collected meet the research objectives. This Phase 3 study has enabled the identification of consumer opinions which can be compared with the baseline measurements, which were carried out in Phase 1 before the implementation of the Yorcard pilot. The key findings from this Phase 3 study are presented below:

Ticket Types and Purchasing

- The vast majority of tickets are still sold on the bus and on train, and the main cause of delays on buses is seen to be people not having their money ready;
- The majority of both non-Yorcard and Yorcard users would like to see information about fares and tickets on the internet and at bus stops.

Public Transport Appeal

- Participants generally stated that even if it were easier to pay for tickets, this would not encourage an increase in Public Transport use. This is in keeping with the findings from Phase 1;
- Many Yorcard users and under 16s stated that more security and quicker boarding times would encourage an increase in Public Transport use. The Yorcard user response to the former question was more positive in this Phase than the response given by participants in Phase 1.

Yorcard

- There has been a marked increase in the awareness of Yorcard in this phase in comparison with Phase 1;
- Smartcards are generally easy to use according to the majority of Yorcard users;
- There is low level of use of Yorcard.com, but of those who had used it, most found it easy to use;
- 5.6% of cards have been exchanged due to a fault and the majority of users have not contacted the Helpline or a TIC for help; those who had used the services were positive about the quality of the services;
- There are users from all age groups who stated that they have increased the number of journeys made per week. The main reasons for this are 'ease of use' and 'it seems cheaper than before';
- Further analysis of the responses shows that 11.5% of users who made more journeys did so for reasons which can be specifically attributed to having a smartcard; this equates to an extra 0.1 journeys per week per person surveyed. Future work with a bigger sample size would allow a more robust analysis when there are more smartcards in circulation;
- Some under 16s and over 60s also stated that their increase in journey frequency was due to the perceived timesaving of smartcard;
- The majority of Yorcard users (63%) stated that they would recommend smartcard to family and friends for bus journeys.

Introduction

Introductory details including background, objectives and Pilot Acceptance Criteria can be found in the General Reference Document. As with the Phase 1 report, this document will address both the relevant Yorcard and DfT objectives, and the Pilot Acceptance Criteria in the conclusion.

There were some issues during the Phase regarding the reliability of the equipment, particularly on the school routes. As a result this may have affected some of the responses and opinions of the participants and the results captured in this Phase 3 study.

Methodology

2.1 Focus Groups

This section presents the outline methodology as recommended in the approved Open System Phase – Consumer Survey Stage Plan (reference YC-IGO-RES-305). The recommendation was to use focus groups in the first instance to aid the design of a questionnaire and obtain qualitative data. The questionnaire was conducted as a combination of postal questionnaires for Yorcard users and one-to-one on-street interviews for non-Yorcard users using trained interviewers within the immediate geographical area of the pilot services.

During this Phase questions relating to smartcards were introduced to the postal questionnaire to probe Yorcard users on their experience and opinions of their card. Aside from these additions to the postal questionnaire, both questionnaires followed the same format and the questions that are used in the baseline Phase of the research were retained, except for reasonable amendments based upon recommendations from Phase 1. The details of this can be found in the Phase 1 Consumer Report.

The use of focus groups was continued for consistency and to ensure that the design process for the final questionnaire, as discussed in detail in the Phase 1 report, was complete. Seven focus groups of 6-12 participants were conducted and segmented into 6 groups as detailed below:

- Senior and Disabled concessions - Bus Users
- Regular bus users – people who make 1 or more return bus journeys per week
- Young people concessions – combination of Bus and Non-users (2 groups were held)
- Infrequent Public Transport users – people who make less than 1 return bus journey per week
- Rail users
- Non-users – people who do not use bus or train

Candidates for the focus group work were canvassed at the same locations as in Phase 1 and the groups were run at convenient locations within the geographical pilot area. There were a mix of male and females, and different social groups. An incentive of £30 was offered to all adult participants in the focus group work.

Generally, the focus groups were able to confirm that the questionnaire addressed the necessary points as raised in the Pilot Acceptance Criteria and the methodology plan for this Phase. The focus groups also allowed for more in depth discussion about the way in which people travel and their use of Public Transport ticketing. For example, where, how and why customers buy the ticket they currently use. It also allowed for a more in depth understanding on the use of Yorcard and the benefits and problems currently being experienced by participants. The results from the focus groups conclude that:

- Yorcard users were positive about the smartcard, but rather negative about the reader:

- The benefits they saw in having a smartcard include convenience (cashless), (potential) improvements to boarding speed, security (value secured if the card is lost) and easy ticketing;
- However, they found that the reader/scanner was unreliable and the display was small and difficult to read.

- In terms of non-Yorcard users:

- The level of awareness of Yorcard among frequent bus users was higher than that among infrequent bus users and non-Public Transport users as a result of seeing adverts, leaflets and signs in various places, readers on the buses and also through word of mouth;
- Their attitudes towards Yorcard were in line with those participants who had used the smartcard;
- Frequent bus users were more likely to use the card in the future than infrequent bus users and non-Public Transport users;
- The discussions also revealed that a discount or a scheme with similar benefits to a loyalty card were more likely to encourage the use of Yorcard in the future.

2.2 On-Street Interview with non-Yorcard users

The on-street interviews were conducted with people who did not use Yorcard and will be referred to as 'non-Yorcard users' for the remainder of this report. The draft questionnaire was tested using feedback from the participants of the focus groups and a test in Newcastle City Centre. This test was used to identify any gaps in the questionnaire, irrelevant questions and strange wording. The results from the pilot suggested that some people used bus and train on an equal basis and felt it difficult to select either 'bus' or 'train'. Hence the third option 'use bus and train equally' was added to Question 10 – 'Excluding the tram, which type of Public Transport do you use most often?' This also applied to the postal questionnaire. The questionnaire used and approved by the Yorcard Working Group was the result of this testing (YC-IGO-RES-307).

The questionnaire was structured in the following order:

Section A. Details the users' personal attributes (for all)
Section B. Questions designed to elicit the participant's use of buses (for bus-users only)
Section C. Questions designed to elicit the participant's use of train (for train-users only)
Section D. Questions regarding opinions of ticket types and purchasing (for Public Transport users only)
Section E. Questions designed to elicit the participant's use of other transport modes (for non-users only)
Section F. Questions regarding Public Transport appeal (for all)

The on-street interviews for Phase 3 took place over a 6-day period, including both week days and weekends, in early April 2009 at times between 8am and 7pm. Interviews with school children took place on one day during the same period at Notre Dame School. All the data has now been collected, entered into a database and cleaned for data coding errors and inconsistencies. The total number of questionnaires collected was 765. Table 1 (Appendix 1) demonstrates the segmentation of participants against the initial plan stated in the methodology document (YC-IGO-RES-305).

It can be seen in Table 1 that the expected numbers of participants were attained except for those aged 16 and under. Further investigation suggests that the vast majority of children in the profile school lived in Sheffield and travelled to school during weekdays as well as other places during the weekends on the bus. As a result it was difficult to reach the sample profile of 15 male and 15 female train users and non-users.

2.3 Postal Questionnaire with Yorcard users

Postal questionnaires were distributed to the users of Yorcard and will be referred to as 'Yorcard user' for the remainder of this report. As mentioned earlier, a third category of 'use bus and train equally' was added to question 10. The draft questionnaire was tested using feedback from the participants of the focus groups and asking consumers to fill in the questionnaire in Newcastle City Centre. As with the on-street questionnaire, this test was used to identify any gaps in the questionnaire, irrelevant questions and strange wording. The questionnaire used and approved by the Yorcard Working Group was the result of this testing (Yorcard Questionnaire v4).

The questionnaire was structured in the following order:

Section A. Questions designed to elicit the participant's use of buses (for bus-users only)
Section B. Questions designed to elicit the participant's use of train (for train-users only)
Section C. Questions regarding opinions of ticket types and purchasing (for Public Transport users only)
Section D. Questions regarding Public Transport appeal (for all)
Section E. Questions designed to elicit the participant's experience of using smartcards on Public Transport (smartcard users only)
Section F. Questions designed to elicit the participant's experience of using smartcards on buses (users who use smartcards on bus journeys only)
Section G. Questions designed to elicit the participant's experience of using smartcards at railway stations (users who use smartcards at railway stations only)
Section H. Details the users' personal attributes (for all)

Overall, 781 questionnaires were sent to smartcard users split into the following age brackets:

- 60 to those aged 16 and under;
- 299 to those aged 17-59;
- 422 to those aged 60 and older.

In total, 378 completed completed questionnaires were collected resulting in a response rate of 48%. The maority of participants were bus users. People aged 60 and older are eligible for free bus travel, which led to a higher than expected percentage of participants aged 60 and above within the sample. Table 2 (see Appendix 1) demonstrates the segmentation of participants against the initial plan stated in the methodology document (RES305).

Results

3.1 Introduction

The reporting of the results will be presented in the following sections: Sample Profile; Ticket Types and Purchasing; Public Transport Appeal; and Yorcard. Sample Profile will present the profile of the participants; age, sex, postcode, occupation and type of transport used. The Ticket Types and Purchasing, and Public Transport appeal sections will present the resulting responses taking into account the differences in the sample for each question. The Yorcard section will be presented in a similar manner. However, only Yorcard users have answered the user experience questions (sections E, F and G in the postal questionnaire). This section also presents the awareness of Yorcard by non-Yorcard users.

3.2 Sample Profile

Among the 765 on-street questionnaires completed by non-Yorcard users, there were 48% male and 52% female. Among the 378 postal questionnaires completed by Yorcard users, there were 52% male and 48% female. The age distribution for 11-16, 17-59 and over 60 is displayed in Table 3 which demonstrates that the sample of non-Yorcard users is reasonably representative of the population distribution in Sheffield whilst the sample of Yorcard users contains higher percentages of people aged 16 and under, and 60 and over, which is reasonably representative of the population of Yorcard users in Sheffield.

Age	Sample of Non-Yorcard Users	Population in Sheffield (2006 Census)	Sample of Yorcard Users	Population of Yorcard Users in Sheffield
16 and under	6.9%	8.2%	15.9%	27.5%
17-59	68.5%	66.3%	40.9%	26.2%
60 and over	24.6%	25.5%	43.2%	46.3%
Total	765	513,234	378	7,871

Table 3: Percentage distribution of age groups collected.

Work Status

In order to determine the diversity of the sample, the occupation of each participant was also collected. With the exception of a minority of consumers, participants were happy to provide this information and this sample is displayed in Table 4.

Work Status	Non-Yorcard User	Yorcard User
Employee in full time work (30+hours)	29.7%	33.6%
Employee in part time work (<30hours)	8.1%	9.3%
Self employed (full or part time)	1.2%	2.9%
Unemployed and available for work	4.3%	0.3%
Wholly retired from work	20.0%	33.1%
In full time education at school, college or university	32.3%	15.6%
Others (on government train programme, permanently sick or disabled, looking after the home or volunteer, etc.)	2.5%	2.1%
Did not provide work status	2.0%	2.9%
Total	765	378

Table 4: Percentage distribution of participants occupation

Type of Transport Users and Profile

In the survey conducted with non-Yorcard users, participants were invited to give the postcode of their home address. Postcode information is considered quite contentious in terms of privacy infringement and as a result 30 participants were not willing to provide this information (4%), which is much lower than that in Phase 1 (10.7%). It is known that the sample of non-Yorcard users were from a wide range of locations since only 41% of them were from the Sheffield pilot corridor. Of the other participants, 35% were from the surrounding areas of Sheffield (those with a non-pilot corridor Sheffield postcode), and 20% were from a variety of other towns and cities around the UK (non-Sheffield postcodes).

The sample of non-Yorcard users based on the type of transport used is shown in Table 5. The percentage split for the number of bus and train users presented in the methodology was met for people aged over 16, but not for the 16 and unders as there were only 2 train users among people in this category. The type of transport used has been broken down to produce a percentage distribution of the users' origins and is presented in Table 5. This table shows that more bus and non-user participants were from Sheffield; however, the majority of train users interviewed were from elsewhere, which is understandable as the pilot train route extends beyond Sheffield.

Type of Transport Users	Live In Sheffield (n=316)	Live Outside Sheffield (n=419)	Total
Bus user (%)	51.7%	48.3%	267
Train user (%)	27.8%	72.2%	209
Use bus and train equally (%)	27.8%	72.2%	18
Non-public transport user (%)	47.7%	52.3%	241

Table 5: Non-Yorcard users - Percentage distribution of transport type used against origin (n=735)

The sample of Yorcard users for the type of transport used is shown in Table 6. As mentioned earlier, because a limited number of train users are using Yorcard, 87% of the participants from this sample are predominantly bus users.

Type of Transport Users	Percentage
Bus user (%)	87% (314)
Train user (%)	10% (36)
Use bus and train equally (%)	3% (11)
Total	361

Table 6: Yorcard users - Percentage distribution of transport type used.

Sections B and C of the on-street interview questionnaire (for non-Yorcard users) and Sections A and B of the postal questionnaires (for Yorcard users) were used to ask participants whether they used the specific mode of transport in the past month which was used to build up a profile of the participants. Participants were asked to describe their main purpose for using this mode and how often they travelled for this purpose in a typical week.

The main purposes of bus journeys were work, education and shopping, for both non-Yorcard users and Yorcard users, although with slightly different percentages: 34.8% and 36% for travelling to and from work, 29.4% and 19.4% for education, and 17.9% and 14.7% for shopping (Figures 1 and 2). These findings are common with the findings from Phase 1.

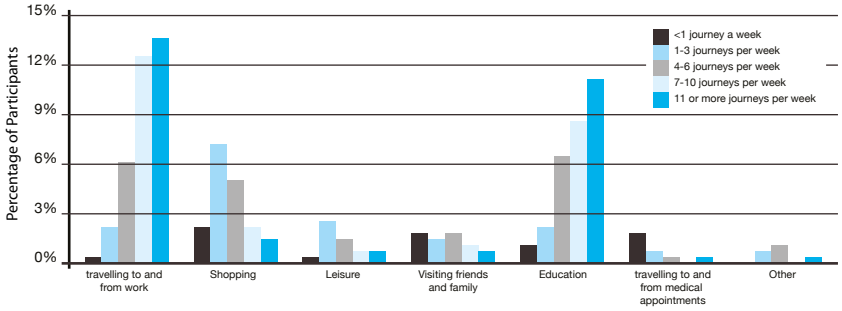


Figure 1: Non-Yorcard users who have travelled by bus in the past month – journey purpose vs. number of journeys per week (n=279)

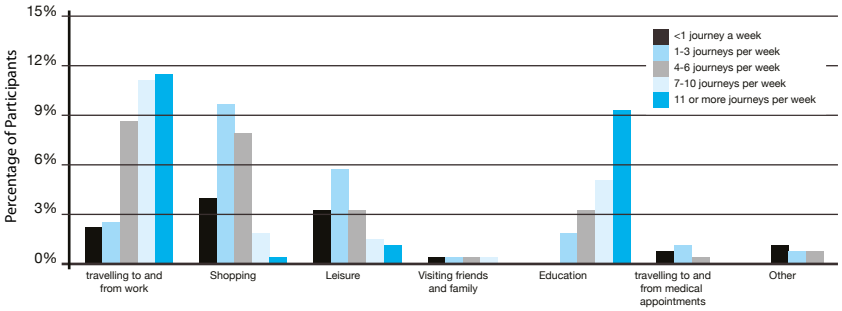


Figure 2: Yorcard users who have travelled by bus in the past month – journey purpose vs. number of journeys per week (n=278)

The main purposes of train journeys for non-Yorcard users were visiting family or friends (32.4%), work (27.9%) and leisure (14.3% - Figure 3), which is common with the findings from Phase 1. The main purpose of train journeys for Yorcard users were the same as the non-Yorcard users but in a different order – leisure (32.5%), work (31.8%) and visiting friends and family (15.9% - Figure 4). Such a difference may have been caused by where the participants reside, as over half of non-Yorcard users lived outside Sheffield whilst all Yorcard-users lived in Sheffield.

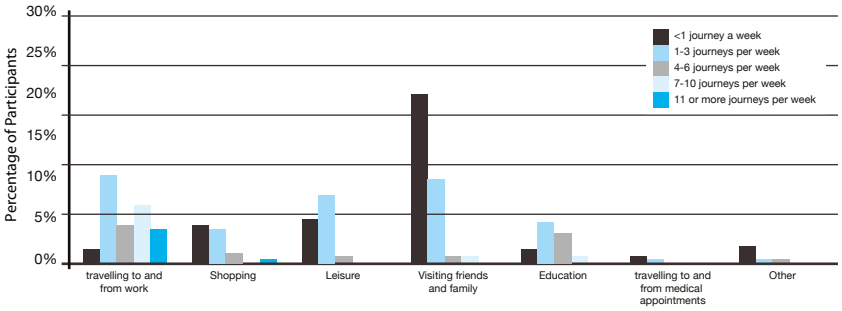


Figure 3: Non-Yorcard users who have travelled by train in the past month – journey purpose vs. number of journeys per week (n=244)

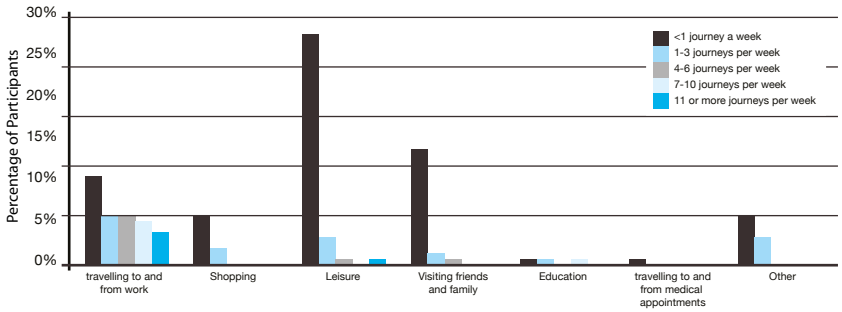


Figure 4: Yorcard users who have travelled by train in the past month– journey purpose vs. number of journeys per week (n=151)

Both non-Yorcard users and Yorcard users who had travelled by bus in the past month were asked to state what they consider to be the main causes of delay from a selection of possible causes. Table 7 shows a cross tabulation of the most frequent cause of delay against age. For both non-Yorcard-users and Yorcard-users, 'people not having their money ready' was the main cause of the delay, which is in line with the findings from Phase 1. For participants aged 16 and under, responses were significantly different from those aged 17 and above. The main cause of delay for this age group was 'lots of people boarding'. It is understood that participants aged 16 and under travelled by dedicated school buses much more often than public buses and either travel for free or pay a flat fare (40p). Hence they would less often encounter the situation of 'people paying with notes' comparing to participants aged 17 and older.

Main cause of the delay	16 and under		17-59		60 and over	
	Non-Yorcard User	Yorcard User	Non-Yorcard User	Yorcard User	Non-Yorcard User	Yorcard User
People paying with notes	8%	8%	19%	20%	22%	10%
Lots of people boarding	55%	42%	33%	34%	17%	40%
People not having their money ready	25%	30%	39%	39%	51%	41%
Long conversations with the driver	12%	20%	10%	7%	10%	9%
Total	51	50	166	100	63	111

Table 7: Main cause of delay when getting on the bus (n=541)

Table 8 shows that non-Yorcard users in Phase 3 travelled by bus and train more often than the participants in Phase 1. It also shows that non-Yorcard users in both Phases 1 and 3 travelled by bus and train more frequently than Yorcard users, particularly those who travelling by train.

How many journeys do you usually make every week	Bus			Train		
	Non-Yorcard User Yorcard User		Yorcard User	Non-Yorcard User Yorcard User		Yorcard User
	Phase 1		Phase 3	Phase 1		Phase 3
<1 journey a week	8.9%	7.3%	11.2%	49.1%	36.5%	64.2%
1-3 journeys per week	24.2%	17.4%	22.4%	30.5%	38.9%	18.9%
4-6 journeys per week	20.6%	22.6%	26.8%	12.6%	11.5%	6.9%
7-10 journeys per week	18.8%	24.7%	18.1%	6.0%	8.6%	5.7%
11 or more journeys per week	27.6%	27.9%	21.5%	1.8%	4.5%	4.4%
TOTAL	384	287	321	167	244	159

Table 8: Frequency of journeys usually made per week

Further examination reveals that:

- the average number of bus journeys made by each participant in a week was 6.2 in Phase 1 and 6.7 in Phase 3 by non-Yorcard users respectively, and 5.7 in Phase 3 by Yorcard users;
- the average number of train journeys made by each participant in a week was 2.2 in Phase 1 and 2.8 in Phase 3 by non-Yorcard users respectively, and 2.0 in Phase 3 by Yorcard users.

There are two possible reasons to explain the fact that non-Yorcard users in both Phase 1 and 3 make more journeys than Yorcard users. First, the majority of Yorcard users are senior and disabled concessionary pass holders who make fewer journeys than commuters. Analysis of the stated journey frequencies shows that those with a concessionary pass made an average of 5.6 bus journeys per week compared to 6.8 bus journeys made by those without a concessionary pass. For rail journeys, the respective average weekly figures are 1.6 and 3.0 journeys. Second, there are only limited train services available in the pilot corridor. This suggests that there could be potential for a significant increase in Yorcard usage when commercial products are introduced and marketed to non-concessionary bus travellers.

3.3 Ticket Types and Purchasing

A 2-tailed Mann-Whitney U test[1] has been conducted to examine the null hypotheses that, for each age group, Yorcard users and non-Yorcard users do not differ from each other in terms of travelling by bus or by train. The results indicate that:

- For those aged 16 and under, Yorcard users and non-Yorcard users do not differ from each other at the 5% level for travelling by buses (p=0.629, Table 9) and for travelling by train (p=0.299, Table 9).
- For those aged 17-59, Yorcard users and non-Yorcard users do not differ from each other at the 5% level for travelling by buses (p=0.083, see Table 9) but differ significantly from each other at the 5% level for travelling by train (p=0.002, Table 9);
- For those aged 60+, Yorcard users and non-Yorcard users differ from each other significantly at the 5% level for travelling by buses and by train (p=0.000, Table 9).

Null Hypothesis		Outcome of Statistical Test	
		Bus Travel	Train Travel
Aged 16 and under	Difference between Yorcard users and non-Yorcard users	P=0.629	P=0.299
Aged 17-59	Difference between Yorcard users and non-Yorcard users	P=0.083	P=0.002*
Aged 60+	Difference between Yorcard users and non-Yorcard users	P=0.000*	P=0.000*

Table 9: Summary of null hypotheses and statistical tests

(*Difference is significant at the 5% level.)

In this section, participants were asked about how they bought tickets for their predominant mode of transport and are segmented into three groups according to their predominant mode: bus-users, train-users and use bus and train equally. A certain level of use and knowledge about tickets was required to answer the question.

Ticket Types

Tables 10 and 11 present the types of tickets used by bus users and where the tickets were bought. The vast majority of bus tickets were bought on the bus with a very small amount of tickets bought in TICs, regardless of whether the user had a Yorcard or not. Comparing to Phase 1, these findings are consistent as almost all tickets were bought on the bus then too. This suggests that if the number of tickets sold on the bus is reduced due to the introduction of Yorcard, it could have a positive impact upon the dwell time at each bus stop, and thus the journey time, as fewer cash transactions are taking place.

To achieve this, Yorcard users should be able to store money onto the smartcard and pay by the card rather than by cash. As this functionality is not planned to be available until Phase 4, there is no reduction in the number of people buying tickets with cash on the bus. At the moment, all Yorcard users are either concessionary users or period pass holders. Monitoring the number of ticket sales on the bus throughout will enable a record of effects on journey time to be kept which is in line with the Pilot Acceptance Criteria.

Type of Ticket	Where do you usually buy your ticket from?			
	On the Bus	TIC	Other	Total
Single	97.7%	2.3%	0.0%	43
40p concessionary pass	100.0%	0.0%	0.0%	46
Return or day ticket	97.1%	2.9%	0.0%	34
Weekly, monthly or longer period ticket	97.3%	2.7%	0.0%	37

Table 10: Non-Yorcard users whose predominant mode is bus (n=160)[2]

[1] A Mann-Whitney U test is used for testing differences between means when there are two groups and different subjects have been used in each group [Source: NORUSIS, M.J. (2004) SPSS 12.0 Guide to Data Analysis New Jersey, Prentice Hall. p388]

[2] It is not possible to buy a single ticket from the TIC, therefore, these participants must be confusing this ticket with another

Table 12 shows that the majority of non-Yorcard train-users bought their tickets on the train. The Internet was the second favourite means of buying single tickets and return or day tickets whilst TIC was the second favourite means of buying period tickets. Table 13 demonstrates that half of the return or day tickets and all period tickets were bought on train by Yorcard train-users.

Type of Ticket	Where do you usually buy your ticket from?			
	On the Bus	TIC	Other	Total
Single	100.0%	0.0%	0.0%	40
40p concessionary pass	100.0%	0.0%	0.0%	52
Return or day ticket	100.0%	0.0%	0.0%	5
Weekly, monthly or longer period ticket	33.3%	66.7%	0.0%	6

Table 11: Yorcard users whose predominant mode is bus (n=103)[3]

Type of Ticket	Where do you usually buy your ticket from?					
	On the Train	TIC	Railway Station	Online	Other	Total
Single	60.0%	0.0%	5.0%	35.0%	0.0%	20
Return or day ticket	70.8%	0.0%	10.0%	16.2%	3.0%	130
Weekly, monthly or longer period ticket	77.8%	11.1%	3.7%	3.7%	3.7%	27

Table 12: Non-Yorcard users whose dominant mode is train (n=177)[4]

Type of Ticket	Where do you usually buy your ticket from?			
	On the train	Railway station	Online	Total
Return or day ticket	50.0%	33.3%	16.7%	6
Weekly, monthly or longer period ticket	100.0%	0.0%	0.0%	4

Table 13: Yorcard users whose dominant mode is train (n=10)

Table 14 displays a cross tabulation of the types of tickets used by non-Yorcard users travelling by bus and train equally and where they bought them from. Among the 15 non-Yorcard users, over half of them bought period tickets with one third bought on the bus, one third in the TIC and one third at the railway station.

Type of ticket	On the bus	Railway station	TIC	Total
Single	1	1	0	2
40p concessionary pass	1	0	0	1
Return or day ticket	2	3	0	5
Weekly, monthly or longer period ticket	1	1	5	7
Total	5	5	5	15

Table 14 Non-Yorcard user who used bus and train equally (n=15)

Figure 5 demonstrates that the majority of non-Yorcard users bought return tickets and period tickets whilst the majority of Yorcard users bought single tickets and paid 40p concessionary fares. There is a slight variation in the tickets purchased and the origin of the participant.

[3] It is not possible to buy Yorcard tickets on the bus therefore, it is assumed that the respondents are describing their previous ticket

[4] Monthly and longer period tickets cannot be bought on the train, therefore these respondents are more likely to have bought weekly passes or season tickets.

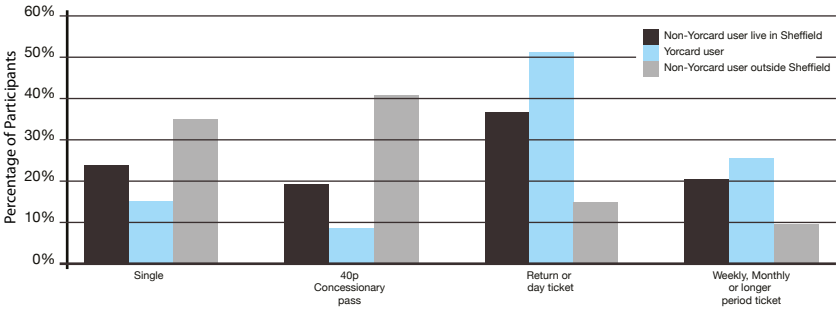


Figure 5: Cross-tabulation of type of ticket usually used by participant origin (n=510)

Reason for Ticket Type Purchase

Participants were asked where they usually bought their tickets (Table 15) and the reasons for buying their chosen ticket. The results are shown in Table 16 (Appendix 1).

Among the 39 non-Yorcard users who bought their tickets through 'other' ways, 30 used the Internet, 6 got their (train) tickets through work and 3 bought their tickets abroad as they were travelling from other European countries. Among the 11 Yorcard users who bought their tickets through 'other' ways, 7 used the Internet and 4 got their passes through work (people who got their passes through work are likely to be PTE staff).

In terms of the reasons for buying their chosen ticket, each participant could have more than one reason. Hence the total number in Table 16 (see Appendix 1) does not mean the number of people but the number of times the reason was chosen by participants. For the majority of participants, the tickets they choose are dependent upon value and convenience. Therefore, as with Phase 1, if Yorcard is to appeal to consumers it is vital that the tickets they purchase are convenient to buy and use, and offers them the best value.

Where do you usually buy your ticket from?	Non-Yorcard User	Yorcard User
On the bus	164	103
Railway station	139	4
TIC	31	2
On train	16	14
Other	39	11
Total	389	134

Table15. Where do you usually buy your ticket from?

Three statements were used to understand why participants chose to buy their tickets in a certain way: 'I find it easy to buy tickets', 'I find it convenient to buy tickets' and 'the tickets available are easy to use'. Figures 6 and 7 demonstrate the respective responses of non-Yorcard users and Yorcard users for each of the questions. For each statement, a higher percentage of non-Yorcard users have chosen the most positive response. Yorcard users' responses are also positive but not as strong as non-Yorcard users. This is likely to be because there have been some bedding-in issues with the Yorcard system, which resulted in some of the equipment being unreliable at the time of survey.

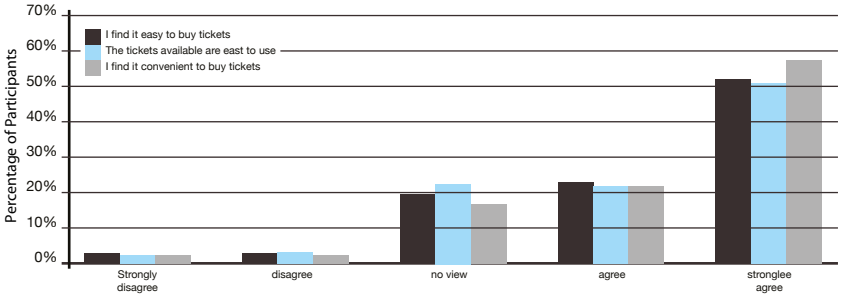


Figure 6: Non-Yorcard users' view on the statements

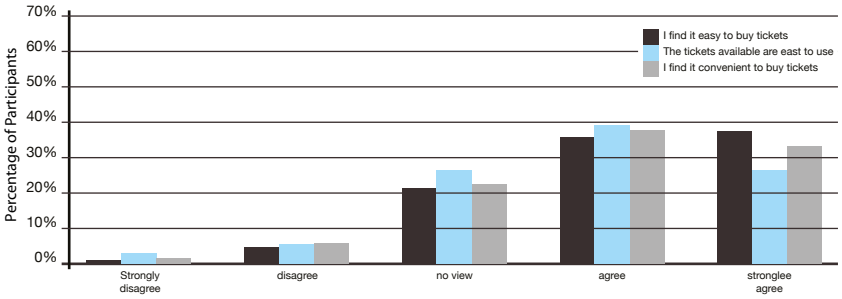


Figure 7: Yorcard users' view on the statements

Ticket Information Source

In terms of where participants would like to get more information about fares and tickets, the most popular choices by non-Yorcard users are 'the Internet' and 'at the bus stops' (Figure 8, Appendix 2). Out of 146 non-Yorcard users who considered that they did not need any more information, 71 were concessionary pass holders. 2 preferred to receive more information on fares and tickets through TV, 2 through telephone enquiry services, 4 through word of mouth and 3 did not specify. The most popular choices by Yorcard users are 'at the bus stops', 'the Internet' and 'leaflets through the door'. Out of 4 Yorcard users who considered that they did not need more information on fares and tickets, 1 was a concessionary pass holder and 3 were period pass holders. 4 preferred to receive more information on fares and tickets through telephone, 2 on board, 1 through word of mouth, 2 did not specify and 1 preferred all the options listed. In general, the demand for more information from Yorcard users is higher than from non-Yorcard users.

Comparing non-Yorcard users' responses with those from Phase 1, more participants of Phase 1 preferred to get more information on fares and tickets from TICs, train stations and the Internet (Figure 9, Appendix 2).

3.4 Public Transport Appeal

The impact of improvements in ticketing and payment on Public Transport was measured by asking participants to rate their agreement with three statements using a 5-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'. Responses are shown in Tables 17 – 22.

The majority of non-Yorcard users, particularly those aged 17 and above did not think that Public Transport would be more appealing to them 'if it was easier to pay for tickets' (Table 17). Yorcard users were more positive than non-Yorcard users as higher percentages of them across all age groups believed that it would make Public Transport more appealing (Table 18).

More than half of non-Yorcard users aged 16 and under believed that Public Transport would be more appealing 'if the tickets were more secure' whilst the majority of those aged 17 and above did not think so (Table 19). Nonetheless, Yorcard users showed more positive views than non-Yorcard users as higher percentages of them believed that 'the tickets were more secure' would make Public Transport more appealing to them (Table 20).

The majority of non-Yorcard users aged 16 and under thought that 'if boarding the bus could be made quicker' Public Transport would appear to be more appealing to them, whilst the majority of those aged 17 and above thought in the opposite way (Table 21). Again Yorcard users were more positive than non-Yorcard users as higher percentages of them across all age groups believed that it would make Public Transport more appealing (Table 22). Comparing to 'if it was easier to pay for ticket' and 'if boarding the bus could be made quicker', 'if boarding the bus could be made quicker' would make Public Transport more appealing to more than half of Yorcard users aged under 60 and over 40% of those aged 60 and above. It is possible that Yorcard users have recognised the potential benefits of using smartcards for Public Transport ticketing from their experiences and therefore they responded more positively.

Age	If it was easier to pay for tickets					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
16 and under	13.5%	23.1%	34.6%	26.9%	1.9%	52
17-59	52.2%	13.5%	11.8%	15.5%	7.0%	502
60 and above	67.9%	9.1%	18.2%	3.7%	1.1%	187

Table 17: non-Yorcard user (n=741)

Age	If it was easier to pay for tickets					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
16 and under	5.1%	5.1%	44.1%	28.8%	16.9%	59
17-59	6.7%	9.3%	44.7%	26.0%	13.3%	150
60 and above	11.5%	9.8%	59.0%	17.2%	2.5%	122

Table 18: Yorcard user (n=331)

Age	If the tickets were more secure					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
16 and under	5.8%	7.7%	32.7%	38.5%	15.4%	52
17-59	42.0%	11.0%	13.1%	20.1%	13.7%	502
60 and above	61.5%	10.7%	20.3%	4.8%	2.7%	187

Table 19: non-Yorcard user (n=741)

Age	If the tickets were more secure					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
16 and under	1.7%	5.1%	30.5%	28.8%	33.9%	59
17-59	6.0%	12.7%	48.0%	22.0%	11.3%	150
60 and above	10.1%	9.2%	61.3%	14.3%	5.0%	119

Table 20: Yorcard user (n=328)

Age	If boarding the bus could be made quicker					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
16 and under	0.0%	11.5%	19.2%	46.2%	23.1%	52
17-59	40.8%	11.4%	15.1%	21.9%	10.8%	502
60 and above	58.3%	11.8%	18.2%	8.0%	3.7%	187

Table 21: non-Yorcard user (n=741)

Age	If boarding the bus could be made quicker					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
16 and under	0.0%	1.7%	25.4%	30.5%	42.4%	59
17-59	5.3%	12.0%	31.3%	33.3%	18.0%	150
60 and above	6.2%	7.0%	45.0%	24.0%	17.8%	129

Table 22: Yorcard user (n=338)

3.5 Yorcard

Comparing to Phase 1, the awareness of Yorcard has increased dramatically from 5% to 38% among non-Yorcard users (see Figure 10).

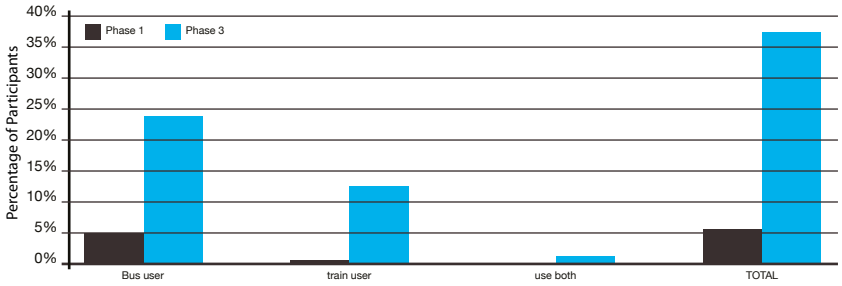


Figure 10: Non-Yorcard users' awareness of Yorcard– comparison between Phase 1 (n=547) and Phase 3 (n=498)

Where did you get your first smartcard from?	16 and under	17-59	60 and over	Total
I was given it in a school	86.3%	0.8%	0.0%	16.7%
I was given an English National concessionary pass	0.0%	3.4%	56.6%	22.3%
I got it from a Travel South Yorkshire Information Centre (TIC)	11.8%	7.6%	39.4%	20.1%
I got it from work	0%	85.7%	1.0%	38.3%
Other	2.0%	2.5%	3.0%	2.6%
Total	51	119	99	269

Table 23: Getting the first smartcard[5]

[5]It is not possible to buy an under 16 Yorcard at the TIC, therefore these participants must be confusing this with another ticket.

The majority of Yorcard users aged 16 and under received their first smartcard from the school and 6 (11.8%) from a TIC. 102 (85.7%) Yorcard users aged 17-59 got their first smartcard from work, 9 (7.6%) from a TIC, one from university and 3 (2.5%) were given an English National concessionary pass (Table 23). As participants were not questioned what their first smartcard was, it is not clear whether the responses are in relation to their first smartcard or Yorcard. This applies to all the issues discussed in this section.

Table 24 presents Yorcard users' view on the ease of use of their first smartcard. The results indicate that the vast majority of participants aged over 16 found it 'not difficult to use' whilst about 9.8% of participants aged 16 and under found it 'difficult' or 'very difficult' to use. A Kruskal-Wallis test[6] has been used to examine the null hypothesis that participants aged 16 and under do not differ from those aged over 16 in terms of the ease of use of their first smartcard. The result shows that participants aged 16 and under are significantly different from those aged over 16 at the 5% level (p=0.002). This is likely to be due to the fact that the perception of the availability of the equipment was lower on the school buses.

[6]A Kruskal-Wallis test is used for testing differences between means when there are more than two conditions and different subjects have been used in each condition (Source: Field, A (2000) Discovering Statistics: using SPSS for Windows,

Ease of use of the smartcard	16 and under	17-59	60 and over	Total
Very easy	27.5%	53.1%	55.1%	48.9%
Easy	33.3%	23.0%	29.6%	27.5%
Neither easy nor difficult	29.4%	23.0%	11.2%	19.8%
Difficult	2.0%	0.0%	3.1%	1.5%
Very difficult	7.8%	0.9%	1.0%	2.3%
Total	51	113	98	262

Table 24: Yorcard users' views on using the smartcard

Ease of use of the website	16 and under	17-59	60 and over	Total
Not used website	70.6%	81.0%	80.9%	78.9%
Very easy	3.9%	3.4%	10.6%	6.1%
Easy	7.8%	6.0%	2.1%	5.0%
Neither easy nor difficult	13.7%	7.8%	3.2%	7.3%
Difficult	2.0%	0.9%	1.1%	1.1%
Very difficult	2.0%	0.9%	2.1%	1.5%
Total	51	116	94	261

Table25: Yorcard users' views on the Yorcard.com website

Table 25 shows Yorcard users' view on the ease of use of the Yorcard.com site. Almost 79% (206 out of 261) of participants had not used the website. Among those who had used the website, over 87% (48 out of 55) found it not difficult to use.

Exchanged card	16 and under	17-59	60 and over	Total
Yes	8.0%	6.8%	3.0%	5.6%
No	92.0%	93.2%	97.0%	94.4%
Total	50	118	100	268

Table26: Yorcard users who have exchanged the smartcard because it was faulty

Contacted Helpline or TIC?	16 and under	17-59	60 and over	Total
Helpline	8.0%	0.0%	0.0%	1.5%
TIC	10.0%	4.2%	13.9%	8.9%
Both	0.0%	0.0%	0.0%	0.0%
None	82.0%	95.8%	86.1%	89.6%
Total	50	119	101	270

Table 27: Yorcard users' use of the helpline and TIC

Services from the Helpline/ TIC	16 and under	17-59	60 and over	Total
Very good	5.3%	11.1%	33.3%	18.4%
Good	47.4%	44.4%	47.6%	46.9%
Neither good nor poor	36.8%	44.4%	14.3%	28.6%
Poor	5.3%	0.0%	0.0%	2.0%
Very poor	5.3%	0.0%	4.8%	4.1%
Total	19	9	21	49

Table 28: Yorcard users' views on the services from the helpline and TIC

Number of public transport journeys	16 and under	17-59	60 and over	Total
1 to 2 journeys per week	30.6%	21.7%	38.5%	29.4%
3 to 4 journeys per week	6.1%	0.0%	3.1%	2.3%
5 to 6 journeys per week	63.3%	78.3%	58.3%	68.3%
7 or more journeys per week	49	120	96	265

Table 29: Yorcard users' view on the changes in the number of Public Transport journeys they have made since having the smartcard

Table 26 shows that 5.6% of respondents have had faulty smartcards. With the increase in age, the percentage of faulty cards decreases. From Yorcard statistics to date, 403 smartcards have been replaced out of a total of 4,151 issued (9.7% - excluding ENCTS passes which Yorcard has no statistics for), which is broadly in line with the survey results and significant in business terms.

Table 27 indicates that the vast majority of Yorcard users have not contacted either the Helpline or TICs for help, particularly those aged 17-59. Views on the services from the Helpline and TICs are shown in Table 28. Over half of the participants from each age group thought the services were 'good' or 'very good'. The level of satisfaction increases with age and is particularly high with those aged 60 and over.

Just over two-thirds of the Yorcard users stated that they would not increase their Public Transport journeys as a result of having a Yorcard (Table 29). Encouragingly, 29.4% (78) of Yorcard users stated that they had made more Public Transport journeys, with the highest percentage of those aged 60 and over. Only 2.3% (6) stated that they had made fewer journeys since having the smartcard.

Number of public transport journeys	16 and under	17-59	60 and over	Total
1 to 2 journeys per week	6	7	19	32
3 to 4 journeys per week	2	3	12	17
5 to 6 journeys per week	3	5	1	9
7 or more journeys per week	4	9	4	17

Table 30: Numbers of Yorcard users who have made more Public Transport journeys per week have made since having the smartcard (n=75)

Reason	16 and under	17-59	60 and over	Total
It is really easy to use	6	6	25	37
I like the technology	1	5	5	11
It saves me time	6	4	10	20
It seems cheaper than before	6	8	16	30
I use the bus or train where before I used a different mode of travel	1	3	12	16
It is not related to having a smartcard	4	12	10	26

Table 31a: Participants who have made more journeys since having the smartcard

The numbers of participants who had made more journeys are shown in Table 30. Out of 78 participants who had made more public transport journeys, 3 did not specify how many more journeys they had made per week.

Participants were asked to choose from several reasons as to why they thought they had made more journeys since receiving their smartcard, and multiple options could be selected (Table 31a).

For the entire sample, 'It is really easy to use' was the main reason followed by 'it seems cheaper than before'. 'It saves me time' is also a popular reason among those aged 16 and under as well as 60 and above.

Participants in Phase 3 made an average of 6.7 journeys per week compared to participants in Phase 1 who made an average of 6.2 journeys per week, an increase of 8.0%. However, Stagecoach Sheffield[7] recently reported an annual patronage increase of 7.1%; therefore, it is likely that the increase in average weekly journeys between the individual phases is not directly linked to possessing a smartcard. To calculate the direct impact of the smartcard in terms of additional journeys made, it was important to isolate those participants who said they had made more journeys and who gave reasons that could be directly attributed to having a smartcard. First, those participants who were in the 17-59 age category were isolated to eliminate any possibility of confusion with lower child fares or with ENCTS. This left 24 participants, who said they made an average of 4.6[8] additional journeys per week. These participants were filtered by removing anyone who stated they made more journeys due to options that could not be directly attributed to smartcards, namely:

- 'I use the bus or train where before I used a different mode of travel; or
- 'It is not related to having a smartcard'

This left 9 participants from the original 78 participants who said they had made more Public Transport journeys since receiving their smartcard. Therefore, 11.5% of respondents who made more journeys did so because of having a smartcard. For these 9 participants, the average number of additional weekly

[7] *http://www.stagecoachbus.com/uploads/AnnualReportSheff09.pdf*

[8] [(1.5 x 7) + (3.5 x 3) + (5.5. x 5) + (7 x 9)]/24 = 111.5/24 = 4.6

journeys remained at 4.6[9] per person. It must be noted that this figure is based upon a small sample and there should be more robust evidence from Phase 4 to corroborate this figure.

The most popular reason amongst these 9 participants for making more journeys was 'It seems cheaper than before' followed by both 'It is really easy to use' and 'I like the technology' (Table 31b).

Reason	17-59 year olds
It is really easy to use	4
I like the technology	4
It saves me time	3
It seems cheaper than before	6

Table 31b: Participants who have made more journeys since having the smartcard (17-59 years old, responses which can be attributed to smartcards.)

To summarise, for the additional journeys that can be attributed to having a smartcard:

- Participants in Phase 3 made 8.0% more journeys than those in Phase 1. Stagecoach Sheffield annual report (footnote [3]) stated that journeys have increased by 7.1%, so it can be assumed that the increase in journeys is not directly related to smartcard availability;
- From this survey, it was found that 78 participants said they had made more journeys since receiving their smartcard;
- Filtering the responses for ENCTS and non-smartcard reasons indicates that 11.5% of participants (9 out of 78) stating that they had made additional journeys did so because of having a smartcard;
- This amounts to 0.1 additional journeys per week per participant surveyed.

The main reasons for not having made more journeys by Public Transport were 'I don't need to/can't make more journeys' and 'it is not related to having a smartcard' (Table 32, Appendix 1). The 'other' reason specified by participants was 'travel by car or tram more often'.

In general, participants' views on using the smartcard on the bus are more positive than those using it at the railway station (Table 33, Appendix 1). The majority of participants using the smartcard on bus journeys 'agreed' or 'strongly agreed' that the smartcard readers had been well placed on the bus, at the right height to use, the displays were easy to read, the lights/beeps could be well seen/heard, and they would recommend using a smartcard for travel on bus to their friends and families. However over half of them found that the smartcard reader did not always work.

Participants' view on using the smartcard at the railway station was mainly neutral where just over half of those using it on train journeys 'agreed' or 'strongly agreed' that the smartcard readers had been at the right height to use (Table 34, Appendix 1). Over half of them 'disagree' or 'strongly disagreed' that 'The smartcard reader always works when I use it'. This view is echoed by the view from those using the smartcard on bus journeys and indicates that the reliability of the system needs to be improved and is critical to enhance the level of user satisfaction.

[9][(4 x 1.5) + (0 x 3.5) + (0 x 5.5) + (5 x 7)]/9 = 41/9 = 4.6

Summary and Conclusions

4.1 Results

The data collection has been completed in line with the Phase 1 recommendations and the methodology for this Phase 3 Consumer Study. In order to capture the opinions of the Yorcard users a new methodology was introduced at this stage which utilised targeted mailing of a postal questionnaire, to compliment the on-street questionnaire, which was used to capture opinions of non-Yorcard users. Initial analysis has established that the sample size was achieved; however there was some deviation away from the sub-targets, particularly Yorcard train users and under 16 non-users. This has little effect on the overall robustness of the data collected as in both cases they have very low population sizes. This initial analysis has highlighted where some areas could be improved in identifying target samples sizes and enabling the collection of a more complete data set in future phases.

Prior to carrying out the on-street and postal questionnaires, focus groups were used to inform the questionnaire and to glean some more in-depth understanding of the interests of Public Transport customers and non-customers. The potential benefits highlighted by Yorcard users, i.e. convenience, improvements to boarding speed, security and easy ticketing are of particular interest. It was also highlighted by many of the participants, both Yorcard and non-Yorcard users, that a discount or loyalty card would encourage the use of Yorcard in the future.

All Yorcard participants are from within the pilot corridor (S1–S10 postcodes) and, as with Phase 1, slightly more non-users and bus users interviewed on street were from within the pilot corridor than outside the corridor, whereas the majority of train users were from outside this corridor. The different modal profiles were very similar to those in Phase 1 in terms of frequency of travel and purpose.

Analysis has been carried out to establish the Yorcard and non-Yorcard user opinion of Public Transport and ticketing. A summary of these results, in comparison with key results from Phase 1, and user experience of using smartcards on public transport are presented below.

Ticket Types and Purchasing

This section presents the results of the types of tickets purchased and the ways in which passengers obtain ticket information. This section also feeds into a number of the objectives including both of the DfT objectives, discussed below, and also the Yorcard objectives, in particular 'improving the sales channels'. The summary of the results from this section are presented here:

- The vast majority of tickets are sold on the bus, as was the case in Phase 1, and the main cause of delays on buses is seen to be people not having their money ready, which again mirrors the responses in Phase 1.
- Most train users buy their tickets on the train whilst in Phase 1 it was found that the majority of train users buy their tickets at the station.
- The majority of both non-Yorcard and Yorcard users would like to see information about fares and tickets on the internet and at bus stops whilst in Phase 1 Internet was not a popular option as respondents stated that they would like this information at bus stops.

Public Transport Appeal

The results from the Public Transport Appeal section relate directly to a number of the Yorcard objectives including: reducing barriers to travel; reducing delays and improving reliability; enhancing the image of Public Transport; improving sales channels; and informing the Business Case. They also relate to the DfT objective of analysing the customer reaction and the customer experience throughout the pilot.

The highlight results from this section are:

- Participants stated that generally even if it were easier to pay for tickets, this would not encourage an increase in Public Transport use. This is in keeping with the findings from Phase 1.

- Many Yorcard users and under 16s stated that more security and quicker boarding times would encourage an increase in Public Transport use. The Yorcard user response to the former question was more positive in this phase than the overall response in Phase 1.

4.2 Limitations

Yorcard
This section was used to understand the awareness of Yorcard in Sheffield in the non-Yorcard user community. It also examines the user experience of smartcards by Yorcard users:

- There has been a marked increase in the awareness of Yorcard in this phase in comparison with Phase 1.
- Smartcard is generally easy to use according to the majority of Yorcard users;
- There is low level of use of Yorcard. com, but of those who had used it, most found it easy to use.
- Some smartcards have had to be exchanged due to being faulty and the majority of users have not contacted the Helpline or a TIC for help. Of those who had used the help service, they found it either 'good' or 'neither good nor poor'.
- 11.5% of Yorcard users had increased the number of journeys as a result of having a smartcard. This equates to an extra 0.1 journeys per week per person surveyed. The main reason was 'it seems cheaper than before'.' However, the average number of journeys made per week by Yorcard users is less than non-users both in Phase 1 and 3.
- Some under 16s and over 60s stated that their main reason for increases in journey frequency was due to the perceived time saving of smartcard.
- The majority of Yorcard users stated that they would recommend using smartcard to family and friends.

Limitations have been identified and therefore, further discussion and work may be required to elicit certain outcomes in Phase 4:

- The sample size for Yorcard users was difficult to establish as the population of existing users was an unknown factor, particularly for train users. It was not anticipated at the time of developing the sample that the train user trial would be reduced in scope. In addition, there are some users who hold anonymous smartcards and therefore contacting them to participate in the survey is not possible. Hence, the sample size stated as required in the methodology was not realistic and therefore, was not achieved.
- Nearly all the children from the school used in this trial now have a Yorcard regardless of whether they travel by Public Transport, therefore, no users interviewed were strictly 'non-Yorcard users'.
- Most of the children interviewed use Public Transport at least once a week even if it is not for travelling to school; therefore, it was difficult to find any non-Public Transport users.
- There were some issues during the phase regarding the reliability of the equipment, particularly on the school routes. As a result this may have affected some of the responses and opinions of the participants and the results captured in this Phase 3 study.

4.3 Objectives

The objective of this study was to ascertain the opinions of the participants to certain questions, and compare them with the responses given in Phase 1. It is important that this report is not taken in isolation and that the data from the other Phase 3 research tasks are used to help support these findings wherever possible. This evaluation will be presented in the End of Phase Report for Phase 3.

This study has set out to meet the objectives of the stakeholders involved in the Yorcard project. In particular, this report documents the performance measures which have been taken following the introduction of smartcard ticketing. It is important that the measurements and information captured and reported by this study are measured against the Phase 1 findings and in the final phase, Phase 4. This will help to understand further if there are key components driving changes to the overall customer opinion of:

- The perception of boarding and journey times
- Ease of product purchase
- Customer support
- Public Transport appeal; and
- To obtain results that will feed into the Business Case.

There have also been elements of the Pilot Acceptance Criteria which were introduced in this phase as they relate directly to smartcards, such as, to monitor the ease of use of the new technology for customers and the customer acceptance of the smartcards. The questions designed to establish the opinions of these elements will be repeated directly in Phase 4.

This Phase 3 Study has, in conjunction with the findings from Phase 1, met the wider objectives of Yorcard and DfT (as described in Phase 1). The impact on DfT and Yorcard objectives and the Business Case will be assessed finally when the equivalent data sets have been captured in Phase 4, and in the final report in, Phase 7.

Recommendations

This section outlines the recommendations for the final phase, Phase 4:

- The methodology outlined in this report will be repeated for Phase 4.
- When designing the sample profile for Yorcard users, the existing population and population forecast should be used to ensure that the required sample is realistic.
- For some of the questions, certain categories had low response rates, therefore it is suggested that the next questionnaire takes these responses into account when updating the question subcategories options. Equally, some questions had high 'other' responses; therefore, these may be added as a subcategory response option.
- In order to capture the opinions of under 16, non-Yorcard users, it should be considered whether another school outside of the pilot corridor could be used.
- With the introduction of smartcard, the questions designed in this section to capture user experience should be repeated word for word or, where necessary, with limited changes; therefore, ensuring the data are robust.

Appendix 1

Appendix 1 - Tables

Age	Type of User	Sex	The expected number of participants	The sample
16 and under 8.2%	Bus user	M	15	19
	Bus user	F	15	30
	Train user	M	0	2
	Train user	F	0	0
	Non-users	M	15	1
	Non-users	F	15	1
TOTAL <16			60	53
17-59 66.3%	Bus user	M	83	80
	Bus user	F	83	85
	Train user	M	83	85
	Train user	F	83	79
	Non-users	M	83	92
	Non-users	F	83	91
	use both equally	M	n/a	4
	use both equally	F	n/a	8
TOTAL 17 - 59			498	524
60+ 25.5%	Bus user	M	30	31
	Bus user	F	30	37
	Train user	M	30	22
	Train user	F	30	28
	Non-users	M	30	31
	Non-users	F	30	35
	use both equally	M	n/a	4
	use both equally	F	n/a	0
TOTAL 60+			180	188
TOTAL SAMPLE			738	765

Table 1: Sample of participants (non-Yorcard users) for the On-street Consumer Questionnaire (Note: participants are categorised by their dominant transport mode).

Age	Type of User	Sex	The expected number of participants	The sample
16 and under 19%	Bus user	M	21	28
	Bus user	F	21	29
	Train user	M	21	0
	Train user	F	21	1
TOTAL 11<16			84	58
17-59 67%	Bus user	M	53	52
	Bus user	F	53	53
	Train user	M	53	20
	Train user	F	53	12
	Use both equally	M	n/a	5
	Use both equally	F	n/a	2
TOTAL 17 - 59			212	144
60+ 14%	Bus user	M	15	75
	Bus user	F	15	73
	Train user	M	15	1
	Train user	F	15	0
	Use both equally	M	n/a	4
	Use both equally	F	n/a	0
TOTAL 60+			60	153
Non-specified				23
TOTAL SAMPLE			432	378

Table 2: Sample of participants for the Postal Consumer Questionnaire (Note: participants are categorised by their dominant transport mode).

How do you decide which ticket to buy?	On the Bus		On the Train		TIC		Railway station		Other	
	non-Yorcard user	Yorcard user	non-Yor-card user	Yorcard user	non-Yor-card user	Yorcard user	non-Yor-card user	Yorcard user	non-Yor-card user	Yorcard user
Convenience	25%	37%	27%	37%	17%	20%	37%	17%	26%	31%
unsure when returning	6%	4%	10%	0%	0%	0%	26%	0%	2%	6%
It's the best value for the travelling I do	52%	31%	61%	53%	74%	80%	37%	17%	56%	50%
I don't know what other tickets are available	5%	11%	0%	0%	3%	0%	0%	17%	2%	0%
I use more than one operator	3%	9%	0%	11%	0%	0%	0%	50%	0%	6%
I use a concessionary pass	8%	8%	3%	0%	6%	0%	0%	0%	14%	6%
TOTAL	185	117	153	19	35	5	19	6	43	16

Table 16: Cross tabulation – how do you decide which ticket to buy and where do you buy your ticket? (non-Yorcard users=471, Yorcard users=163)

Reason	16 and under	17-59	60+	Total
It is too complicated, or I don't understand how to use it	5	0	0	5
The equipment never seems to work properly	5	5	3	13
It takes too much time	3	0	1	4
It seems too expensive	0	0	0	0
I don't need to/can't make more journeys	8	42	32	82
I would rather use another mode of travel than bus or train	4	8	2	14
It is not related to having a smartcard	11	41	21	73
Other	2	13	1	16

Table 32: Yorcard users who have made the same or fewer journeys since having the smartcard.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
I find the smartcard reader is well placed on the bus	34.6%	44.9%	13.5%	5.4%	1.6%	185
The smartcard reader is at the right height for me to use	34.2%	48.9%	14.7%	1.6%	0.5%	184
The display on the smartcard reader is easy to read	24.0%	42.1%	21.3%	9.8%	2.7%	183
I can see the lights on the smartcard reader well	22.4%	38.8%	24.6%	11.5%	2.7%	183
I always hear the smartcard reader beep when I use my smartcard	28.0%	38.2%	18.8%	11.3%	3.8%	186
The smartcard reader always works when I use it	10.4%	22.4%	21.3%	27.9%	18.0%	183
I would recommend using a smartcard for travel on bus to my friends and family	23.2%	38.7%	29.8%	5.5%	2.8%	181

Table 33: Use Yorcard on bus journeys

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
I find the smartcard reader is easy to find at the railway station	10.3%	26.5%	30.9%	25.0%	7.4%	68
The smartcard reader is at the right height for me to use	16.9%	40.0%	36.9%	4.6%	1.5%	65
The display on the smartcard reader is easy to read	11.1%	28.6%	36.5%	20.6%	3.2%	63
I can see the lights on the smartcard reader well	12.7%	28.6%	39.7%	15.9%	3.2%	63
I always hear the smartcard reader beep when I use my smartcard	15.6%	15.6%	48.4%	12.5%	7.8%	64
The smartcard reader always works when I use it	7.8%	9.4%	29.7%	15.6%	37.5%	64
There are enough smartcard readers around the railway station	9.5%	20.6%	38.1%	20.6%	11.1%	63
I would recommend using a smartcard for travel on train to my friends and family	15.4%	12.3%	52.3%	12.3%	7.7%	65

Table 34: Use Yorcard at the railway station

Appendix 2

Appendix 2 - Figures

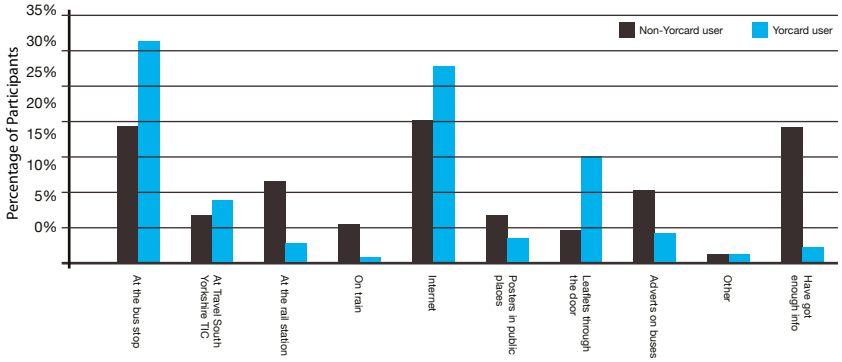


Figure 8. How would you like to get more information about fares and tickets?

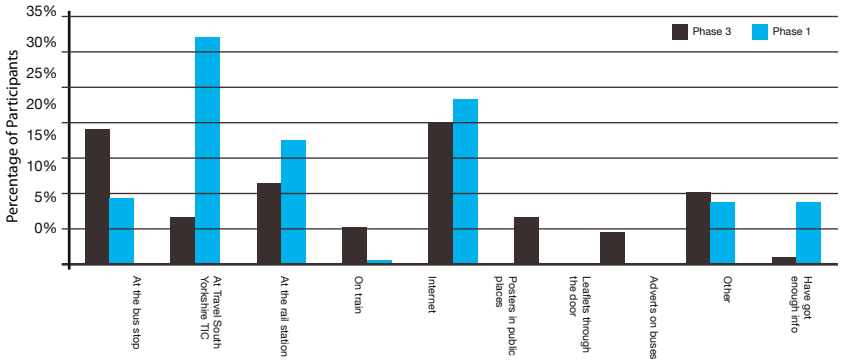


Figure 9: Non-Yorcard users - comparison between Phase 1 and Phase 3

Notes

RES734 Phase 3: End of Phase Report

Contents

1.0 Introduction

2.0 Methodology & Planning Review

3.0 Analysis of Phase 3 Data

This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

4.0 Limitations & Review of Objectives

5.0 Advice for the Business Case

6.0 Recommendations

7.0 Appendices

Executive Summary

The Yorcard Project is intended to deliver a multi-modal, multi-operator public transport smartcard scheme to be trialled on certain buses in Sheffield and on the local train service between Sheffield and Doncaster and intermediate stations.

This report presents:

- A summary of the deliverables forming the contract between DfT and SYPTE
- How each deliverable was completed, and how progress was made throughout Phase 3
- A review of DfT and Yorcard objectives and how objectives have been met
- A review of the methodologies used including the limitations, risks and issues that arose during the Phase 3 work
- The findings from Phase 3 that are common across different studies
- Recommendations for the future delivery of the Yorcard research programme

Introduction

1.1 Background

This Yorcard Phase 3 End of Phase Report sets down the outputs forming part of a research contract between the South Yorkshire Passenger Transport Executive (SYPTE) and the Department for Transport (DfT), Transport Technology and Standards Division. An overview of the tender and a full description of the Yorcard pilot can be found in the General Reference Document.

The purpose of this report is therefore to provide an evaluation of the results from the Phase 3 reports and determine any cross-over between the findings. It is also the purpose to review the delivery of the Phase and identify any lessons learned from a practical perspective regarding the management of the Phase and how this could be improved in the future.

1.2 Summary of Deliverables

The intention of Phase 3 was to baseline measurements that would be tracked throughout the life of the Yorcard Pilot to enable monitoring of change and evaluation of the scheme. There were 3 primary deliverables in Phase 3:

- A boarding time study
- An equipment user study with bus drivers
- A Bus and Rail user study
- And this end of stage report

1.3 Review of Progress of Deliverables

The requirement of data collection was that all data must have been collected before any part of the Yorcard technology was being actively used by the public in touch on touch off (exit reading) mode on bus. (Touch on Touch off is also referred to as the closed system in reports.)

Issues with the reliability of on-bus equipment continued throughout Phase 3 and meant that mainly ENCTS transactions were being processed at the time of data collection. In addition, sales of commercial bus tickets remained very low in Phase 3.

Moreover, the on-board revenue protection facility on trains was removed, and there was a decision made by the Yorcard project board not to retail point to point rail tickets in the pilot. This action meant that the pilot could be run for a longer period.

The boarding time study was changed to record and report on transaction times from outside of the pilot area. The aim of the study was to collect additional baseline data (phase 1) to enable a robust evaluation of the effect of different ticket types on the various measurements of boarding, alighting and dwell times. The study maintained a 3,000 sample of boarding observations. This was undertaken because it was agreed by Yorcard stakeholders that the Phase 2 boarding time study accurately reflected the operations of the open system in Phase 3 and that it was unlikely to change until the closed system went live. This exercise has added significant value to the research programme. From the successful application of regression analysis, dwell times based upon individual ticket type data was obtained.

Also as a result of the operating environment not changing materially since Phase 2, it was agreed by Yorcard stakeholders not to undertake the equipment user survey with bus drivers. There will be additional evaluation in Phase 4 to compensate for this.

1.4 Review Against Budget

The costs were within the agreed limits for the Phase. To ensure that sufficient data quality was obtained, it was necessary to add incentives of £100, £50 (x2) and an I-Pod (for children) by means of a prize draw for the Consumer Survey.

1.5 Meeting DfT Objectives

The DfT have stipulated the following objectives as part of the tender specification:

a. All elements of the pilot scheme shall be fully compliant to the prevailing ITSO documentation.
b. Conduct a robust analysis of (1) bus boarding times, (2) Systems performance and (3) passenger reaction to address the concerns of all key stakeholders involved in the rollout of smartcard technologies within a deregulated transport industry. This should provide a comparison of existing performance measures prior to the introduction of smartcards to the pilot area.
c. The research shall assess the Customer Experience and the Operator and PTE expectations and provide recommendations for rollout. Included within this analyses shall be a study of the business case for deployment of similar regional schemes.
d. To understand the value of new innovative ticketing products to the key stakeholders
e. To understand the value of using Citizen Cards as an alternative to transport only smartcards.
f. To ensure that all deliverables are clear, concise, accurate, thorough, of a high technical quality and well written.
g. The research shall complement the Yorcard pilot timetable.

This report must therefore evaluate how the relevant objectives will be met.

1.6 Meeting Yorcard Objectives

It is also important to consider the objectives of Yorcard and its stakeholders. This report will consider how the most relevant objectives are likely to be influenced by Yorcard.

The remaining objectives are predominantly technical and will be evaluated in other phases of this research work. The list of Yorcard objectives is shorter than that in Phase 1 because there was no consumer survey in Phase 2. Please refer to the General Reference Document for the full list

- Reduce barriers to the use of public transport;
- Reduce delays and improving reliability;
- Reduce fraud of all types; and
- Enhance the image of public transport;
- Improve sales channels;
- Inform business cases.

Methodology & Planning Review

This section provides a review of the methodology used and explores how the processes for delivery of future phases of this research project can be improved.

2.1 Review

The studies were conducted in accordance with the agreed methodologies. Recommendations from Phases 1 and 2 were taken into account. The changes to methodology were:

- Use a Control Group to establish a baseline for collecting boarding time measurements relative to ticket type.
- To the sample size of the consumer survey to include SYPTE staff as 'adult users' due to the low volume of commercial bus ticket sales

2.2 Risks and Issues

The following risks were identified as being relevant to Phase 3:

- The Yorcard pilot timescales were shortening and the scope of the Yorcard pilot was changing (out of the research project control). This could have impact on data volume and robustness.

  The data were collected within the agreed timescales. Effort was concentrated on recruiting additional 'adult' users for the consumer survey which achieved the desired results in terms of data quality – CLOSED.

The following Issues were identified as being relevant to Phase 3:

- Bus operators were unable to provide sufficiently detailed data to support the ticket type evaluation.

  The boarding time study was changed to account for the changes and a Control Group study was undertaken. The exercise using the Control, Group was in addition to the data collected for boarding and alighting times in Phase 3 of the pilot. Methodology for Phase 4 should also account for this – CLOSED

- The Yorcard pilot was re-scoped at the start of Phase 3 with the conclusion of the rail smart operations at the end of December 2008.

  The scope and detailed methodology of some Phase 3 studies was amended to account for the changes to scope.

2.3 Lessons Learned

Project based lessons learned relating to the delivery of the Yorcard project in general will be presented in the Best Practice Final Report. The key rail participants in the project have agreed to contribute to workshops to document lessons learned, scheduled for delivery in Phase 4. Workshops with other stakeholders have started to be planned.

There were no research based lessons learned relating to planning and delivery of the reports.

Analysis of Phase 3 Data

3.1 Summary of Analysis

The results presented in this section are relating to the findings in Phase 3 reports that reference any impact to other studies, or report common results found in other studies. This is analysed below, and should be monitored in future phases. A summary table of the key findings relative to the Yorcard and DfT objectives is shown at appendix 1.

3.2 Bus Stop Dwell Time

		PHASE 1	PHASE 2	PHASE 3
		Mean Time – sec (Standard Deviation)	Mean Time – sec (Standard Deviation)	Mean Time – sec (Standard Deviation)
Bus Stop Dwell Time:	per bus	28.66	40.77	47.00
		(68.06)	(60.69)	(50.20)
	per boarding and alighting passenger	7.08	12.35	7.20
		(9.98)	(26.69)	(11.66)
Bus Stop Boarding/ Alighting Time:	per bus	23.78	33.14	42.90
		(34.95)	(51.95)	(48.10)
	per boarding and alighting passenger	5.76	9.08	5.85
		(9.22)	(13.33)	(10.30)

Table 1: headline statistics from the boarding time studies.

Bus Stop Dwell Time is the total time that the bus is at a particular stop and, in terms of the analysis, the effect of Yorcard on this time could have the greatest impact for the operator. An overview of the headline times is shown in table 1.

A regression analysis was performed to understand the relationship between Dwell Time and different ticket types for paper based tickets. This is represented below:

Dwell Time (seconds) = 13.7 + (7.15 Adult Cash) + (2.79 Child Cash) + (4.19 Flash Pass) + (1.98 Alighting Passengers) + (8.97 Vehicle Type 'Double decker')

The regression analysis performed in Phase 2 used more ticket categories than in Phase 3 and so a direct comparison is not possible. It is recommended that Phase 4 should report on this and allow for a comparison of outputs by Phase.

3.3 Perceptions of Delay

The results from the consumer survey reported that the main perception of delay from the customer perspective remains people not having their money ready. Although there is some evidence to suggest that certain smartcard tickets and passes may actually be slower than the paper equivalent, this was not raised by the customers.

It is possible that the perception of people not having their money ready could be reduced during Phase 4 through the launch of the Pay as You Go ticket. This will need to be accounted for in the appropriate studies.

Limitations & Review of Objectives

4.1 Limitations

The analysis carried out for this report has enabled the identification of the important calculations to compare throughout this research project. Each of the measurements identified in this report will be taken in turn to highlight and summarise the important findings in relation to the objectives. this will also identify which measurements are important for comparison in future phases of the research programme.

Limitations have been identified and therefore, further work may be required to ensure data quality in later phases. The limitations are as follows:

- There remained issues with the reliability of the on bus equipment. In previous reports, the reliability was reported at 70-80%. However at the time of data collection, the reliability had improved to about 95% and above for First and Stagecoach, and considerably less for Mass. This may have affected the results of the consumer survey.

- Because the pilot was underway when the Phase 3 bus stop Dwell Time Control Group data collection was scheduled, the data were collected at equivalent bus stops outside the pilot corridor as far as possible. This resulted in an increase in Dwell Time as some of the stops were much busier. However, the data analysis has shown that the data collected for Phase 3 is from the same population of bus users in Phase 1 and, therefore, has had no detrimental effect on the overall results.

- Three ticket types were used in the Phase 3 Study based on recommendations from Phase 2. Although this is less than was stated in the phase methodology plan, this allowed for a more robust regression analysis to be conducted and a reliable baseline to be established. The introduction of smartcard in future Phases will require an additional ticket type factor to be included in the regression analysis.

4.2 Objectives

It is also important that this report is not taken in isolation and that the data from other research tasks are used to help support these findings wherever possible. This report identifies any cross over and links back to Phases 1 and 2.

This study has set out to meet the objectives of the stakeholders involved in the Yorcard project. A full assessment of the impact on project objectives is shown at appendices 1 & 2.

Advice for the Business Case

The business case remains in its early stages of development and thus, the recommendations for rollout and deployment will be much more obvious as the results for the later phases are analysed. This will enable the identification of which factors Yorcard is likely to be able to influence.

The studies undertaken during Phase 3 have enabled measurements to be compared to the measurements taken in Phases 1 and 2 where appropriate. However, it remains unclear at present which will be the most prominent and reliable measurements that should be used. This will change over time as more evidence is collected regarding the impact of smartcard use.

Recommendations

To date, the data collection and evaluation for Phase 3 has been completed. The analysis presented in the Phase 3 reports has provided robust results suggesting that the data collected are reliable.

Recommendations appropriate to each deliverable have been made in each respective report.

- The methodology outlined in this report will be repeated for Phase 4.
- With the introduction of smartcard, it is recommended that 3 equivalent smart-ticket types (smart adult cash, smart child cash and smart flash pass) should be recorded in the Phase 4 bus stop Dwell Time study in conjunction with the ticket types used in Phase 3 as this will allow for any potential impact of the smartcard to be identified in detail. Keeping the number of ticket types collected by the surveyors to a minimum will keep their tasks manageable, therefore, ensuring the data are robust.

It is also recommended that there is a more detailed evaluation regarding the impact of the results on a regional scheme roll out once the key measurements have been identified. This may require more involvement from the Yorcard Stakeholders regarding the impact, but will enable a full and balanced evaluation for the Best Practice Final Report.

Appendix 1

Appendix 1 - Summary of the analysis of Yorcard Objectives

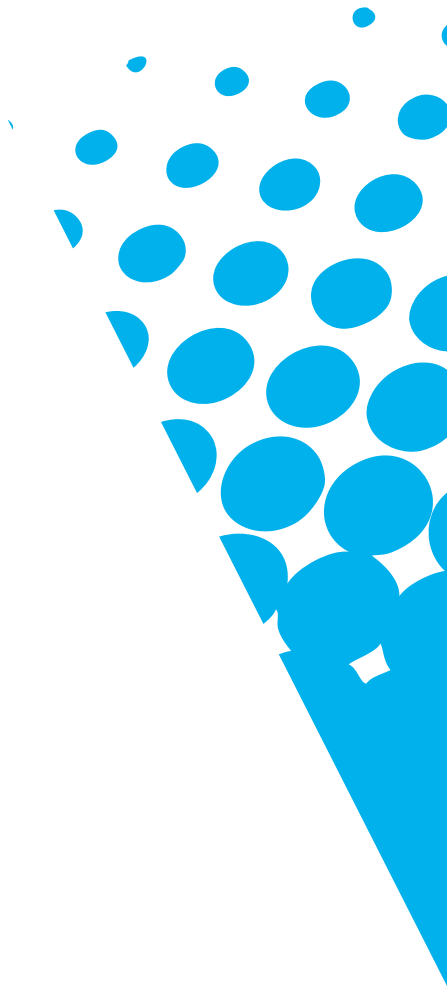
		Study Deliverable	
	Objective	Boarding Time	Consumer
1	Reduce barriers to the use of public transport	There is evidence to suggest that boarding times have increased. This could be because of the new ETM however, external factors could have had an effect.	The results of the consumer survey indicate that a very small number of bus journeys have been generated as a direct result of introducing smartcards for all groups of users. In some cases, this was because smartcards are perceived as being easier to use, and consumers like the technology.
2	Reduce delays and improving reliability	See Objective 1 above.	The evidence suggests that it is perceived that delays on the bus are caused more by people not having their money ready than by anything else. The inference that some smartcard tickets may be slower than their paper equivalents was not noticed by customers.
3	Reduce fraud of all types	N/A	There is evidence to suggest that patronage would increase if smartcard tickets would fully realise their security features (e.g. in terms of cancelling and replacing smartcards).
4	Enhance the image of public transport	N/A	See Objective 1 above.
5	Reduce administrative costs	N/A	N/A
6	Improve sales channels	N/A	N/A
7	Improve MTC revenue distribution by providing more accurate information on journey lengths	N/A	N/A
8	Prove ITSO compliant equipment and operational protocols in a major scheme	N/A	N/A
9	Integrate with Real Time Information	N/A	N/A
10	Inform Business Cases	To be discussed in later Phases.	

Note: N/A in this context (and for the next table) means not applicable in terms of this Phase and study output. The full research programme will deliver against each objective for the Best Practice Final Report in Phase 7.

Appendix 2

Appendix 2 - Summary of the analysis of DfT Objectives

		Study Deliverable	
	Objective	Boarding Time	Consumer
a	All elements of the pilot scheme shall be fully compliant to the prevailing ITSO documentation.	N/A	N/A
b	Conduct a robust analysis of (1) bus boarding times, (2) Systems performance and (3) passenger reaction to address the concerns of all key stakeholders involved in the rollout of smartcard technologies within a deregulated transport industry. This should provide a comparison of existing performance measures prior to the introduction of smartcards to the pilot area.	Further measurements taken in Phase 3 have been compared to the measurements in Phases 1 and 2. Tracking of changes will continue in future Phases.	Passenger reaction has been captured in the consumer survey report. The reaction of the passenger has been reported as being very positive. Although certain smartcard tickets may be slower than paper equivalents, this was not reflected in the customer survey.
c	The research shall assess the Customer Experience and the Operator and PTE expectations and provide recommendations for rollout. Included within this analyses shall be a study of the business case for deployment of similar regional schemes.	As (b) above. Tracking will allow the evaluation of the impact of the use of smartcard technology, and be able to be grossed up to the passenger journeys in the region (or similar).	As (b) above.
d	To understand the value of new innovative ticketing products to the key stakeholders.	To be discussed in later Phases.	
e	To understand the value of using Citizen cards as an alternative to transport only smartcards.	To be discussed as part of Phases 6 and 7.	
f	To ensure that all deliverables are clear, concise, accurate, thorough, of a high technical quality and well written.	Clear reports have been written based on a template agreed by research stakeholders.	
g	The research shall complement the Yorcard pilot timetable.	All data were collected within the agreed timescales immediately following smartcard technology being installed on bus.	



Res 803 The Yorcard Data Book: **Phase 3**

Contents

This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

3.0 Calendar of Events

4.0 Results

Executive Summary

1.1 Additions to this version of the Data Book

This is the third Data Book for the Yorcard project, and includes a summary of the data collected during the Phase 3 surveys - boarding time and consumer surveys - from January 1st to July 21st 2009.

The Data Book also includes an incident report and calendar of events, information on patronage figures for the pilot routes used in this Yorcard project on local trains between Sheffield-Doncaster, and monthly weather reports from January 2009 to July 2009.

1.2 Summary of Data Interpretation

The data collected during Phase 1 was used to establish a baseline scenario against which the results of future phases are compared, in order to measure and monitor the impact of the introduction of the Yorcard smartcards. Smartcards were introduced to a limited number (69) of school children on 19th February 2008 (approximately halfway through the duration of Phase 1) before going live in Phase 2 on Stagecoach pilot services on 28th April 2008 and on First pilot services through September 2008. Rail services went live shortly after, on November 3rd 2008.

Comparison of the survey results between Phase 1 and Phase 2 suggested that the new ETMs had a slightly negative impact on operations. Key statistics from the Boarding Time studies showed an increase in the average Dwell Time and Boarding/ Alighting times from Phase 1 to Phase 2. Results from the Drivers Survey indicated that in Phase 2, all the ETM tasks were perceived to be slightly more difficult, and a lot more time consuming compared to Phase 1.

The Driver Survey commenced towards the end of Phase 2, shortly after all pilot services went live, it was suggested that the bedding-in period of the new ETMs and drivers learning how to operate them could have had an effect on the results. As Phase 3 went live so soon after the Phase 2 data collection, it was decided that it was unnecessary to undertake a Driver or TIC Survey in this Phase as the results would be similar.

Comparing the key statistics from the respective Boarding Time studies between Phases 2 and 3 indicates an increase in the average dwell and boarding/alighting times, but the standard deviation for both measurements has decreased, suggesting the boarding/alighting process is slightly more consistent in Phase 3 than in Phase 2. Looking at the average boarding/alighting time per boarding/alighting passenger reveals that this measurement has also decreased from Phase 2 to Phase 3, from 9.08 seconds per passenger to 5.85 seconds respectively; the Phase 3 figure being similar to the baseline figure established in Phase 1 (5.76 seconds).

It is encouraging to note that there is virtually no change in Consumer opinion about the convenience and ease of use of the ticketing regimes between Phase 1 and Phase 3.

Data collected in Phase 4 will allow for a more meaningful comparison of the operational impacts and benefits of the introduction of Smartcards to be measured and monitored, and a greater discussion of these impacts will be included in the final Phase 4 Data Book.

1.3 Effects of the Calendar of Events

The introduction of smartcards across all the pilot routes was spread across Phase 2 and the Touch-on operations continued throughout Phase 3. Apart from two days of extreme weather (flooding), and one day where cable was stolen, causing the rail pilot services to be cancelled, there does not appear to be any significant impact of the events included in the Calendar of Events upon the data collected or on patronage levels throughout Phase 3.

Comparisons will be made between Phases as the Yorcard project progresses to ascertain whether there are any external events which could have had an impact upon operational performance, patronage and thus influence the results of any data collection exercises.

1.4 Content of the Next Data Book

The next Data Book will contain similar reports and analysis derived from the data collected during the respective Phase 4 studies.

The Data Book – Background & Introduction

2.1 Scope of the Data Book

The Yorcard Project was intended to deliver a multi-modal, multi operator public transport smartcard scheme to be trialled in part of the South Yorkshire area during 2008. The scheme offers certain commercial and concessionary ticket products in 'Smart' format and is built to the ITSO specification. Yorcard Limited has procured all the hardware, software and services required to enable the successful implementation of a Pilot scheme. The Pilot was mounted on the services of three bus operators in the S10 area of Sheffield and on Doncaster to Sheffield rail services. Details of the Yorcard project and the research programme can be found in the research General Reference document.

This Yorcard Data Book is the document that sets out detail results of the outputs of the Pilot for use by Yorcard Project Stakeholders and other public and private sector participants. It is also available for use by any organisation that is considering implementing either a new ITSO compliant public transport smartcard scheme, or those considering the extension or upgrade of an existing smartcard scheme, in accordance with the conditions for circulation set down from time to time.

The Yorcard Data Book sets down the consolidated outputs of a research contract between the South Yorkshire Passenger Transport Executive (SYPTE) and the Department for Transport (DfT) Transport Technology and Standards Division.

The scope of the Data Book is to facilitate:

- Evaluation of the success of Yorcard Pilot by individual stakeholders on both technical and commercial grounds and thus to:

- Inform both public and private sector business cases for the expansion of the system to full roll out in South and West Yorkshire across all modes of transport.

- Informed discussions with potential funding organisations.
- Negotiations with Scheidt and Bachmann (primary supplier) under the terms of the Supply and Service Agreement entered into in 2007 with a view to the full roll out.

The Data Book is prepared in such a manner that:

- It complies with the terms set out in the Yorcard 'Participation Agreements';
- It enables commercially confidential data to be protected; and
- It complies with all current competition legislation at the time of initial preparation and that it can be adapted during the currency of the Pilot period should there be any change to or judicial interpretation of such legislation howsoever arising.

Calendar of Events

3.1 Data Collection Methodologies

The Calendar of Events sets out background reasons for any deviation from the baseline data collected within the live Yorcard Pilot and reference periods.

The Calendar of Events started in June 2007 and shows occurrences of any and all of the following so far as information is available. For Phase 3, the Calendar of Events commences with the subsequent event following on from the end of Phase 2 (end of December 2008) and finishes in July 2009.

Primary events listed in the Calendar include the following:

- Major road incidents (roadworks, accidents, exceptional traffic levels and congestion);
- Delays to the Public Transport networks (engineering works, route diversions);
- Alterations to Public Transport services (timetable changes, route revisions, ticketing, ENCTS introduction, marketing, information and associated promotions);
- Special calendar dates (public holidays, school and university holidays, religious days, industrial action);
- Yorcard data collection dates;
- Yorcard project milestones; and
- Exceptional meteorological events (heavy rain, snow)

3.2 Calendar of Events

The following table shows key events and any significant meteorological conditions which could have had an impact on services during the data collection for this Phase.

Date(s) and time(s)	Event
31 December 2008	Pilot trials on Sheffield-Doncaster local rail services discontinued
2 January 2009	Price increases in TravelMaster ticket range
3 January 2009	First increase single fares (mainly by 10p for short and medium length journeys) and most day (50p), week (£1) and month (varies) ticket prices. Red and orange tickets remain the same.
w/c 12 January 2009	Phase 3 Boarding Time Study Data Collection
w/c 19 January 2009	Phase 3 On-street Consumer Survey Data Collection.Phase 3 Focus Groups Conducted (Schools). Phase 3 Focus Groups Conducted (Consumer Groups)
2 February 2009	Stagecoach reduce price of tram/bus day ticket from £3.50 to £3
2 February 2009	Heavy snow for 7-10 days causing disruption to bus and rail services
9 February 2009	University of Sheffield start 3 week break
16 February 2009	School half term holidays start.
6 April 2009	Schools begin Easter holidays. University of Sheffield start 3 week break. Sheffield Hallam University start 2 week break
18 May 2009	***Stagecoach launch 4 weekly MegaRider in smartcard format***
25 May 2009	School half term holidays start
w/c 1 June 2009	***Phase 6 (Citizen Card) surveys distributed***
10 June 2009	Severe delays and some cancellations of rail services due to flooding in the Sheffield area
11 June 2009	Pilot rail services between Doncaster and Sheffield replaced by buses due to flooding in the Sheffield area
12 June 2009	University of Sheffield summer term ends
24 June 2009	Sheffield Hallam University summer term ends
25 June 2009	Pilot rail services between Doncaster and Sheffield cancelled due to cable theft in the Sheffield area (am only)
9 July 2009	***Launch of Pay as you Go smartcard***
10 July 2009	Industrial action at First – no First pilot services running
20 July 2009	***Launch of smart First Week Red (52) product***
20 July 2009	Stagecoach 120 service ; retime buses. Stagecoach 52 service : minor modification to route through Ballifield estate
21 July 2009	Schools start summer holidays

Table 1 – Calendar of Events occurring during Phase 3

Notes to accompany Calendar of Events:

1. Data collection dates have w/c and the first Monday to avoid any issues regarding reporting of sensitive data and if data collection was multiple days in a week.
2. Yorcard project milestone dates in ***bold italics.***

3.3 Summary of Monthly Weather Reports

A daily weather report was obtained from Weston Park weather station, the official climatological station in Sheffield. The following tables present a monthly summary of the weather conditions throughout the data collection for this Phase, with more detailed data and discussion occurring in other reports.

January 2009 Summary	Temperature (Max.)	Temperature (Min.)	Temperature (Max. & Min.)	Rain (mm)	Sunshine (Hours)
Monthly Total	-	-	-	47.2	59.8
Monthly Average	5.7	1.2	3.4	1.5	1.9
Long Term Trend	6.5	1.6	4.1	87	73

February 2009 Summary	Temperature (Max.)	Temperature (Min.)	Temperature (Max. & Min.)	Rain (mm)	Sunshine (Hours)
Monthly Total	-	-	-	26.8	60.5
Monthly Average	6.6	2.2	4.4	1.2	2.2
Long Term Trend	6.7	1.6	4.2	63	57

March 2009 Summary	Temperature (Max.)	Temperature (Min.)	Temperature (Max. & Min.)	Rain (mm)	Sunshine (Hours)
Monthly Total	-	-	-	44.7	160.7
Monthly Average	10.7	3.9	7.3	1.4	5.4
Long Term Trend	9.3	3.1	6.2	68	105

April 2009 Summary	Temperature (Max.)	Temperature (Min.)	Temperature (Max. & Min.)	Rain (mm)	Sunshine (Hours)
Monthly Total	-	-	-	52.7	139.4
Monthly Average	14.5	6.0	10.3	1.8	5.0
Long Term Trend	11.8	4.5	8.2	63	130

May 2009 Summary	Temperature (Max.)	Temperature (Min.)	Temperature (Max. & Min.)	Rain (mm)	Sunshine (Hours)
Monthly Total	-	-	-	92.6	216.0
Monthly Average	16.2	8.0	12.1	3.0	7.0
Long Term Trend	15.7	7.0	11.4	56	185

June 2009 Summary	Temperature (Max.)	Temperature (Min.)	Temperature (Max. & Min.)	Rain (mm)	Sunshine (Hours)
Monthly Total	-	-	-	178.9	183.4
Monthly Average	19.0	10.9	15.0	6.0	6.1
Long Term Trend	18.3	10.0	14.2	67	177

July 2009 Summary	Temperature (Max.)	Temperature (Min.)	Temperature (Max. & Min.)	Rain (mm)	Sunshine (Hours)
Monthly Total	-	-	-	126.3	199.7
Monthly Average	20.2	12.6	16.4	4.1	6.4
Long Term Trend	20.8	12.4	16.6	51	195

Results

4.1 Bus Patronage

This data has been supplied by SYPTE and covers the larger operators in the area, accounting for approximately 97% of bus operations in South Yorkshire.

Data includes school operations provided by the operators supplying the data. Values are not adjusted to take account of the other 3% as these services are primarily school services.

Year	Quarter	Months Covered	Patronage (Millions)
2009	Q1 2009	January to March	28.78
	Q2 2009	April to June	29.00

4.2 Rail Patronage[1]

Figures represent the scaled number of tickets sold per month for travel between stations on the pilot route which are fitted with Yorcard equipment (Sheffield, Meadowhall, Rotherham Central, Swinton, Mexborough, Conisborough and Doncaster) only. Figures are based upon a sample of less than 1% of journeys which are then scaled up to estimate the total numbers.

Passengers travelling on this line as part of a through journey (e.g. Leicester to Grimsby via Sheffield) are not included.

Source: SYPTE monitoring origin and destination surveys.

[1] Data is supplied for information only. From 31st December 2008 the Rail Smartcard operations were concluded

2009

Ticket Type	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
Adult Return	41475	47775	32414	31982	32749	48553	28422		
Adult Single	14464	21724	14791	17027	18141	24626	11180		
Child Concessions	6000	11310	3854	6998	7685	8854	8194		
Child Non Concessions	29041	27736	35249	24613	33033	42412	18656		
Other	0	0	0	338	0	561	335		
Pre-Paid (Other)	15357	15313	12132	13248	13987	30128	10567		
Pre-Paid (PTE)	48398	68456	51542	58341	56136	89783	37615		
Unknown	635	145	148	523	764	439	329		

4.3 Service Performance Outputs - Survey Results

This section will report on the research outputs.

Boarding Time - Phase 3

	Boarding Time Measurement (see below)	Average (Mean) (Sec.)	Standard Deviation (Sec.)	Buses Observed (no.)	Minimum (Sec.)	Q1 (Sec.)	Median (Sec.)	Q3 (Sec.)	Maximum (Sec.)
Data without Other Factors	A	47.00	50.20	936	3.29	16.28	31.89	57.81	399.96
	B	42.90	48.10	936	1.68	13.86	27.83	54.02	397.01
	C	5.85	10.30	936	0.65	3.13	4.47	7.00	125.95
	D	15.30	36.60	163	0.32	5.31	8.38	17.60	285.34
	E	11.60	13.30	54	1.51	4.23	7.63	12.97	125.67
	F	36.10	36.06	335	1.01	7.07	15.76	34.81	379.00
	G	3.85	3.34	33	0.58	0.95	1.53	5.32	30.57
	H	28.60	37.28	177	0.30	5.76	15.67	34.07	230.69
	I	7.75	11.32	53	0.30	2.41	3.40	5.38	74.51
	J	19.97	10.36	558	0.45	3.09	6.33	13.59	82.60
	K	2.70	1.39	119	0.08	0.84	1.23	1.66	12.92

Boarding Time - Phase 2

	Boarding Time Measurement (see below)	Average (Mean) (Sec.)	Standard Deviation (Sec.)	Buses Observed (no.)	Minimum (Sec.)	Q1 (Sec.)	Median (Sec.)	Q3 (Sec.)	Maximum (Sec.)
Data without Other Factors	A	40.77	60.69	1212	2.38	12.58	23.47	42.03	542.69
	B	33.14	51.95	1212	1.97	9.73	18.90	34.46	560.21
	C	9.08	13.33	1212	0.75	3.10	5.55	9.45	124.70
	D	19.81	36.71	303	1.39	7.26	12.14	23.77	242.01
	E	17.71	32.07	158	1.97	7.02	10.23	19.53	123.59
	F	25.88	50.96	474	0.83	4.05	10.22	26.83	590.21
	G	4.90	6.82	274	0.42	1.67	3.22	5.73	75.29
	H	14.04	15.65	191	0.38	2.68	7.00	17.00	221.32
	I	4.62	1.44	92	0.38	2.03	2.67	3.50	9.31
	J	9.00	12.24	504	0.13	3.00	6.24	12.28	154.13
	K	1.38	0.71	268	0.01	0.98	1.25	1.54	6.50

Boarding Time - Phase 1

	Boarding Time Measurement (see below)	Average (Mean) (Sec.)	Standard Deviation (Sec.)	Buses Observed (no.)	Minimum (Sec.)	Q1 (Sec.)	Median (Sec.)	Q3 (Sec.)	Maximum (Sec.)
With Other Factors	A	34.25	72.52	1049	2.66	10.90	18.71	34.07	1884.03
Data without Other Factors	A	28.66	68.06	965	2.66	10.19	17.95	29.34	1884.03
	B	23.78	34.95	965	0.40	8.00	14.67	26.01	596.66
	C	5.76	9.22	965	0.40	2.47	4.16	6.60	241.98
	D	10.47	23.82	254	0.60	3.83	6.07	9.92	268.35
	E	9.51	19.21	128	0.60	3.52	6.00	10.69	212.48
	F	19.79	37.63	448	0.47	3.35	8.01	22.32	568.6
	G	2.91	2.37	254	0.24	1.21	2.25	3.80	15.30
	H	9.34	6.32	34	3.31	4.75	6.55	11.57	24.40
	I	7.57	1.83	16	5.00	6.12	7.01	9.40	10.94
	J	18.95	10.76	161	3.79	11.66	17.56	23.90	62.43
	K	2.44	0.76	94	1.42	1.89	2.27	2.94	5.56

Boarding Time Measurements

A	Dwell Time	G	Boarding Time (2) per boarding passenger (no alighters)
B	Average Bus Stop B/A time	H	Average Alighting Time (1)
C	Bus Stop B/A time per B/A passenger	I	Alighting Time (1) (no boarders)
D	Average Boarding Time (1)	J	Average Alighting Time (2)
E	Boarding Time (1) (no alighters)	K	Alighting Time (2) per alighting passenger (no boarders)
F	Average Boarding Time (2)		

Please refer to the General Reference Document for a detailed definition of each measurement.

Consumer Survey

Section 1 – About You

Base = All Respondents. Phase 1 = 946, Phase 3 = 1143)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
1a	Age	16 and under	75	8%	No Consumer Survey in Phase 2		112	10%		
		17-59	617	65%			676	59%		
		60 and over	252	27%			349	31%		
		Missing/No Answer	2	0%			6	1%		
1b	Gender	Male	473	50%			562	49%		
		Female	471	50%			573	50%		
		Missing/No Answer	2	0%			8	1%		
1c	Home Postcode	Not to be reported (Personal Data Confidentiality)								
1d	Which of the statements best describes you at the moment?	Employed in full time work	264	28%	No Consumer Survey in Phase 2		354	31%		
		Employed in part time work	67	7%			97	8%		
		Self employed	16	2%			20	2%		
		Gov't training programme	4	0%			1	0%		
		Unemployed and available for work	24	3%			34	3%		
		Permanently sick or disabled	8	1%			18	2%		
		Wholly retired from work	228	24%			278	24%		
		Looking after the home	13	1%			6	1%		
		In full time education	298	32%			306	27%		
		Refused to tell	5	1%			2	0%		
		Missing/No Answer	19	2%			27	2%		
1e	Which of the following types of transport have you used in the past month?	Bus	514	54%			650	57%		
		Train	305	32%			426	37%		
		Tram	385	41%			N/A	N/A		
		None of the above	209	22%			N/A	N/A		

Section 2 – Non-Bus Users

(Base = Respondents who didn't use Bus or Train in Q1. Phase 1 = 383, Phase 3 = 316)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
2a	What type of transport do you use most frequently?	Tram	161	42%	No Consumer Survey in Phase 2		54	17%		
		Car	143	37%			31	10%		
		Taxi	2	1%			3	1%		
		Motorcycle	2	1%			N/A	N/A		
		Pedal cycle	2	1%			4	1%		
		Walking	60	16%			42	13%		
		Park and tram	1	0%			N/A	N/A		
		Other	2	1%			119	38%		
		Missing/No Answer	10	3%			63	20%		
2b	Why do you prefer to use this mode of transport rather than bus or train?	It is convenient	212	55%			162	51%		
		It costs less than using other modes	52	14%			41	13%		
		I can travel alone - it's peaceful/ quieter	16	4%			34	11%		
		It's quicker than other modes	74	19%			71	22%		
		I can exercise at the same time	25	7%			14	4%		
		I don't know how to use public transport	1	0%			2	1%		
		Other	107	28%			59	19%		

Section 3 – Public Transport Appeal

(Base = Various. Phase 1 = 946, Phase 3 = Various)

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
3a	Please tell me how strongly you agree or disagree with the following statements	I find it easy to buy tickets	4	No Consumer Survey in Phase 2	4.1	
			4		4.5	
			0.92		0.97	
		I find it convenient to buy tickets	3.8		4.0	
			4		4.5	
			0.97		1.00	
		The tickets available are easy to use	4.2		4.1	
			4		4.5	
			0.86		0.98	
		I have a ticket or pass to suit my travel needs	3.9		N/A	
			4		N/A	
			1.25		N/A	
3b	Which of the following would encourage you to use public transport more?	If it were easier to pay for tickets	2.6		2.6	
			3		2	
			1.34		1.15	
		The tickets were more secure	2.9		2.8	
			3		2.5	
			1.41		1.24	
		If boarding the bus could be made quicker	N/A		3.0	
			N/A		3	
			N/A		1.26	
3c	Please rank the following statements regarding thoughts to causing delays to public transport journeys	People paying with notes	2.5		2.5	
			2		3	
			0.5		0.97	
		Lots of people boarding	2.2		2.2	
			2		2	
			1.06		1.10	
		Not having money ready	2		2.0	
			2		2	
			0.98		0.90	
		Long conversations with the driver	3.2		3.3	
			4		4	
			1.03		1.02	

Section 4 – Purchasing Tickets

(Base = Respondents who used Bus or Train in Q1. Phase 1 = 563, Phase 3 = 643)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
4a	Which type of public transport do you use most often?	Bus	383	68%	No Consumer Survey in Phase 2		354	55%		
		Train	171	30%			241	37%		
		Missing/No Answer	9	2%			24	4%		
4b	What type of ticket do you usually use?	Single ticket	122	22%			24	4%		
		Free concess'ry pass	159	28%			80	12%		
		40p concess'ry pass	41	7%			67	10%		
		Return or day ticket	142	25%			156	24%		
		Period ticket (of any length)	90	16%			51	8%		
		Missing/No Answer	9	2%			289	45%		
4c	What type of period ticket do you usually use?	Not to be reported (Commercial Sensitivity)								
4d	Where do you usually buy your ticket from?	On the bus	244	43%	No Consumer Survey in Phase 2		136	21%		
		Railway station	76	13%			147	23%		
		Online	35	6%			N/A	N/A		
		TIC	146	26%			20	3%		
		On train	8	1%			8	1%		
		Local shop or Paypoint store	2	0%			N/A	N/A		
		Other	25	4%			40	6%		
		Missing/No Answer	27	5%			292	45%		
4e	How do you decide which ticket to buy?	Convenience	131	23%			175	27%		
		Unsure when returning	39	7%			41	6%		
		Best value for the travelling I do	229	41%			319	50%		
		I don't know what other tickets are available	6	1%			28	4%		
		I use more than one operator	7	1%			23	4%		
		I use a concessionary pass	198	35%			N/A	N/A		
		Other	8	1%			40	6%		
4f	Where do you usually find information about public transport fares and tickets?	Traveline	22	4%			N/A	N/A		
		On the bus	99	18%			N/A	N/A		
		Online	187	33%			N/A	N/A		
		Railway station	51	9%			N/A	N/A		
		TIC	94	17%			N/A	N/A		
		On the train	1	0%			N/A	N/A		
		At the bus stop	32	6%			N/A	N/A		
		Word of mouth	21	4%			N/A	N/A		
		Other	11	2%			N/A	N/A		
		Missing/No Answer	45	8%			N/A	N/A		
4g	Do you usually find the information accurate?	Yes	485	86%			N/A	N/A		
		No	44	8%			N/A	N/A		
		Missing/No Answer	34	6%			N/A	N/A		
4h	How would you like to get more information about fares and tickets?	At the bus stop	245	44%			241	22%		
		TIC	N/A	N/A			77	7%		
		Railway Station	N/A	N/A			95	9%		
		On train	N/A	N/A			42	4%		
		Internet	N/A	N/A			237	22%		
		Posters in public places	143	25%			59	5%		
		Leaflets through door	117	21%			80	7%		
		Adverts on bus	146	26%			94	9%		
		Other	46	8%			176	16%		

Section 5 – Journeys by Bus

(Base = Various. Phase 1 = 383, Phase 3 = 650)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
5a	How many bus journeys do you usually make every week?	<1	31	8%	No Consumer Survey in Phase 2		57	9%		
		1-3	92	24%			121	19%		
		4-6	81	21%			151	23%		
		7-10	72	19%			129	20%		
		11+	101	26%			149	23%		
		Missing/No Answer	6	2%			43	7%		
5b	Which is your most frequent purpose for travelling by bus?	To/from Work	95	25%			197	30%		
		Shopping	90	23%			117	18%		
		Leisure	46	12%			59	9%		
		Visiting friends and family	29	8%			23	4%		
		Education	109	28%			137	21%		
		To/from Medical appointments	3	1%			15	2%		
		Other	1	0%			13	2%		
		Missing/No Answer	10	3%			89	14%		
5c	Is your most frequent journey a single or return?	Single	141	37%			N/A	N/A		
		Return	229	60%			N/A	N/A		
		Missing/No Answer	13	3%			N/A	N/A		
5d	For your most frequent journey which day/s do you travel in a typical week?	All weekdays	283	74%			N/A	N/A		
		Monday	36	9%			N/A	N/A		
		Tuesday	31	8%			N/A	N/A		
		Wednesday	39	10%			N/A	N/A		
		Thursday	30	8%			N/A	N/A		
		Friday	42	11%			N/A	N/A		
		Saturday	117	31%			N/A	N/A		
		Sunday	86	22%			N/A	N/A		
5e	For your most frequent journey, what time do you normally travel?	Single Journey								
		M-F bef. 0900	121	32%	No Consumer Survey in Phase 2		N/A	N/A		
		M-F 0900-1530	90	23%			N/A	N/A		
		M-F 1530-1830	11	3%			N/A	N/A		
		M-F after 1830	5	1%			N/A	N/A		
		Sat bef. 1830	7	2%			N/A	N/A		
		Sat after 1830	5	1%			N/A	N/A		
		Sun bef. 1830	1	0%			N/A	N/A		
		Sun after 1830	1	0%			N/A	N/A		
		No fixed time	120	31%			N/A	N/A		
		Missing/No Answer	22	6%			N/A	N/A		
		Return Journey								
		M-F bef. 0900	2	1%	No Consumer Survey in Phase 2		N/A	N/A		
		M-F 0900-1530	44	11%			N/A	N/A		
		M-F 1530-1830	113	30%			N/A	N/A		
		M-F after 1830	19	5%			N/A	N/A		
		Sat bef. 1830	6	2%			N/A	N/A		
		Sat after 1830	1	0%			N/A	N/A		
		Sun bef. 1830	5	1%			N/A	N/A		
		Sun after 1830	0	0%			N/A	N/A		
		No fixed time	83	22%			N/A	N/A		
		Missing/No Answer	110	29%			N/A	N/A		
5f	For your most frequent journey what routes do you normally use?	Not to be reported (Commercial Sensitivity)								

Q'n No.	Question	Answer Categories	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
5g	Thinking about how you use your smartcard on bus, how strongly do you agree or disagree with the following statements? (1 = Strongly Disagree, through to 5 = Strongly Agree)	Smartcard reader is well placed on bus	N/A	No Consumer Survey in Phase 2	4.2	
			N/A		4	
			N/A		0.74	
		Smartcard reader is at the right height	N/A		4.2	
			N/A		4	
			N/A		0.7	
		Smartcard reader display is easy to read	N/A		3.9	
			N/A		4	
			N/A		0.95	
		I can see smartcard reader lights	N/A		3.7	
			N/A		4	
			N/A		1.01	
		I can hear smartcard reader beeps	N/A		3.8	
			N/A		4	
			N/A		1.02	
		Smartcard reader always works	N/A		2.8	
			N/A		3	
			N/A		1.27	
		I would recommend smartcards	N/A		3.9	
			N/A		4	
			N/A		0.86	

Section 6 – Journeys by Train

(Base = Various. Phase 1 = 171, Phase 3 = 426)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
6a	How many train journeys do you usually make every week?	<1	80	47%	No Consumer Survey in Phase 2		191	45%		
		1-3	51	30%			125	29%		
		4-6	21	12%			39	9%		
		7-10	10	6%			30	7%		
		11+	3	2%			18	4%		
		Missing/No Answer	6	4%			23	5%		
6b	Which is your most frequent purpose for travelling by train?	To/from Work	30	18%			116	27%		
		Shopping	18	11%			37	9%		
		Leisure	38	22%			85	20%		
		Visiting friends and family	61	36%			103	24%		
		Education	11	6%			30	7%		
		To/from Medical appointments	5	3%			4	1%		
		Other	2	1%			21	5%		
		Missing/No Answer	6	4%			30	7%		
6c	Is your most frequent journey a single or return?	Single	18	11%			N/A	N/A		
		Return	144	84%			N/A	N/A		
		Missing/No Answer	9	5%			N/A	N/A		
6d	For your most frequent journey which day/s do you travel in a typical week?	All weekdays	50	29%			N/A	N/A		
		Monday	27	16%			N/A	N/A		
		Tuesday	39	23%			N/A	N/A		
		Wednesday	36	21%			N/A	N/A		
		Thursday	29	17%			N/A	N/A		
		Friday	68	40%			N/A	N/A		
		Saturday	46	27%			N/A	N/A		
		Sunday	44	26%			N/A	N/A		

Q'n No.	Question	Answer Categories	Phase 1		Phase 2	Phase 3		Phase 4	
			Mean		Mean	Mean		Mean	
			Median		Median	Median		Median	
			Std. Dev.		Std. Dev.	Std. Dev.		Std. Dev.	
6e	For your most frequent journey, what time do you normally travel?	Single Journey							
		M-F bef. 0900	22	13%	No Consumer Survey in Phase 2	N/A	N/A		
		M-F 0900-1530	27	16%		N/A	N/A		
		M-F 1530-1830	15	9%		N/A	N/A		
		M-F after 1830	6	4%		N/A	N/A		
		Sat bef. 1830	10	6%		N/A	N/A		
		Sat after 1830	0	0%		N/A	N/A		
		Sun bef. 1830	0	0%		N/A	N/A		
		Sun after 1830	0	0%		N/A	N/A		
		No fixed time	74	43%		N/A	N/A		
		Missing/No Answer	17	10%		N/A	N/A		
		Return Journey							
		M-F bef. 0900	1	1%	No Consumer Survey in Phase 2	N/A	N/A		
		M-F 0900-1530	5	3%		N/A	N/A		
		M-F 1530-1830	26	15%		N/A	N/A		
		M-F after 1830	13	8%		N/A	N/A		
		Sat bef. 1830	2	1%		N/A	N/A		
		Sat after 1830	3	2%		N/A	N/A		
		Sun bef. 1830	13	8%		N/A	N/A		
		Sun after 1830	9	5%		N/A	N/A		
		No fixed time	69	40%		N/A	N/A		
		Missing/No Answer	30	18%		N/A	N/A		
6f	Do you travel on local train service between Doncaster and Sheffield? If so which stations do you use?	Sheffield	66	39%		361	85%		
		Meadowhall	39	23%		81	19%		
		Rotherham Cen	22	13%		32	8%		
		Swinton	22	13%		4	1%		
		Mexborough	21	12%		4	1%		
		Conisbrough	20	12%		3	1%		
		Doncaster	52	30%		79	19%		
		Don't travel on this line	96	56%		27	6%		
6g	Thinking about how you use your smartcard on train, how strongly do you agree or disagree with the following statements? (1 = Strongly Disagree, through to 5 = Strongly Agree)	Station s/card readers are easy to find	N/A		No Consumer Survey in Phase 2	3.1			
			N/A			3			
			N/A			1.13			
		Smartcard reader is at the right height	N/A			3.7			
			N/A			4			
			N/A			0.86			
		Smartcard reader display is easy to read	N/A			3.3			
			N/A			3			
			N/A			0.99			
		I can see smartcard reader lights	N/A			3.3			
			N/A			3			
			N/A			1.02			
		I can hear smartcard reader beeps	N/A			3.2			
			N/A			3			
			N/A			1.07			
		Smartcard reader always works	N/A			2.2			
			N/A			2			
			N/A			1.29			
		Enough readers around stations	N/A			2.9			
			N/A			3			
			N/A			1.04			
		I would recommend smartcards	N/A			3.1			
			N/A			3			
			N/A			1.08			

Section 7 – Experiences of Using Smartcards on Public Transport

(Base = All who said they have got a smartcard in Q7a. Phase 3 = 273)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
7a	Where did you get your first smartcard from?	In school	N/A	N/A	No Consumer Survey in Phase 2		43	16%		
		Given ENCTS	N/A	N/A			59	22%		
		From TIC	N/A	N/A			51	19%		
		Other	N/A	N/A			120	44%		
7b	How easy do you think it was when you got your first smartcard?	Very Easy	N/A	N/A			130	48%		
		Easy	N/A	N/A			73	27%		
		Neutral	N/A	N/A			53	19%		
		Difficult	N/A	N/A			4	1%		
		Very Difficult	N/A	N/A			6	2%		
		Missing/No Answer	N/A	N/A			7	3%		
7c	How easy do you find using the yorcard.com website?	Not Used Website	N/A	N/A			210	77%		
		Very Easy	N/A	N/A			16	6%		
		Easy	N/A	N/A			13	5%		
		Neutral	N/A	N/A			19	7%		
		Difficult	N/A	N/A			3	1%		
		Very Difficult	N/A	N/A			4	1%		
		Missing/No Answer	N/A	N/A			8	3%		
7d	Have you had to exchange your smartcard because it was faulty?	Yes	N/A	N/A			16	6%		
		Easy	N/A	N/A			256	94%		
		Missing/No Answer	N/A	N/A			1	0%		
7e	Have you contacted the helpline or a TIC for help with your smartcard?	Helpline	N/A	N/A			4	1%		
		TIC	N/A	N/A			24	9%		
		Both	N/A	N/A			0	0%		
		None	N/A	N/A			245	90%		
		Missing/No Answer	N/A	N/A			0	0%		

(Base = Those who had required help in Q7e. P3 = 28)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
7f	How would you rate the service you received?	Very Good	N/A	N/A	No Consumer Survey in Phase 2		6	21%		
		Good	N/A	N/A			16	57%		
		Neutral	N/A	N/A			3	11%		
		Poor	N/A	N/A			1	4%		
		Very Poor	N/A	N/A			1	4%		
		Missing/No Answer	N/A	N/A			1	4%		

(Base = All who said they have got a smartcard in Q7a, split by non-ENCTS and ENCTS cardholders. Phase 3 = 214+59)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n1	n1%	n1	n1%
							N2	n2%	n2	n2%
7g	Do you think you have changed the frequency of Public Transport journeys?	More journeys	N/A	N/A	No Consumer Survey in Phase 2		50	23%		
							25	42%		
		Less journeys	N/A	N/A			5	2%		
							1	2%		
		About the same	N/A	N/A			153	71%		
							28	47%		
		Missing/No Answer	N/A	N/A			6	3%		
							5	8%		

n1 – non-ENCTS cardholders; n2 – ENCTS cardholders

(Base = Those who said they made more journeys in Q7g, split by non-ENCTS and ENCTS cardholders. Phase 3 = 50+25)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n1	n1%	n1	n1%
							N2	n2%	n2	n2%
7h	How many more Public Transport journeys per week have you made since receiving your smartcard?	1 to 2	N/A	N/A	No Consumer Survey in Phase 2		23	46%		
							8	32%		
		3 to 4	N/A	N/A			7	14%		
							10	40%		
		5 to 6	N/A	N/A			7	14%		
							2	8%		
		7 or more	N/A	N/A			11	22%		
							4	16%		
		Missing/No Answer	N/A	N/A			2	4%		
							1	4%		

n1 – non-ENCTS cardholders; n2 – ENCTS cardholders

(Base = Those who said they made more journeys in Q7g, split by non-ENCTS and ENCTS cardholders. Phase 3 = 50+25)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n1	n1%	n1	n1%
							N2	n2%	n2	n2%
7i	Why have you made more Public Transport journeys made since receiving your smartcard?	Easy to use	N/A	N/A	No Consumer Survey in Phase 2		20	40%		
							15	60%		
		Like technology	N/A	N/A			8	16%		
							3	12%		
		Saves time	N/A	N/A			15	30%		
							4	16%		
		Seems cheaper	N/A	N/A			16	32%		
							12	48%		
		Used different mode of travel previously	N/A	N/A			7	14%		
							7	28%		
		Not related to having a smartcard	N/A	N/A			10	20%		
							3	12%		
		Other	N/A	N/A			9	18%		
							4	16%		

n1 – non-ENCTS cardholders; n2 – ENCTS cardholders

(Base = Those who said they made the same or fewer journeys in Q7g, split by non-ENCTS and ENCTS cardholders. Phase 3 = 158+29)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n1	n1%	n1	n1%
							N2	n2%	n2	n2%
7j	Why have you made the same or fewer Public Transport journeys made since receiving your smartcard?	Complicated/ don't understand it	N/A	N/A	No Consumer Survey in Phase 2		5	3%		
							0	0%		
		Equipment doesn't work properly	N/A	N/A			10	6%		
							3	10%		
		Takes extra time than before	N/A	N/A			4	3%		
							0	0%		
		Seems more expensive than before	N/A	N/A			2	1%		
							0	0%		
		Don't need to or can't make more journeys	N/A	N/A			63	40%		
							19	66%		
		Would rather use other modes	N/A	N/A			13	8%		
							0	0%		
		Not related to having a smartcard	N/A	N/A			60	38%		
							11	38%		
		Other	N/A	N/A			16	10%		
							0	0%		

n1 – non-ENCTS cardholders; n2 – ENCTS cardholders

YORCARD Awareness (All users. Phase 1 = 937, Phase 3 = 765)

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
-	Yorcard is a public transport smartcard for storing tickets and passes. Have you heard of it?	Yes	52	6%	No Consumer Survey in Phase 2		230	30%		
		No	854	91%			518	68%		
		Missing/No Answer	31	3%			17	2%		

Driver Survey

Section 1 – Employment

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
1a	How many years experience do you have?	0<2	18	17%	24	19%	No Driver Survey in Phase 3			
		2<4	19	18%	20	16%				
		4<6	10	10%	11	9%				
		6<8	12	11%	14	11%				
		8 or more	46	44%	57	45%				
1b	Do you work full or part time?	Not to be reported (Commercial Sensitivity)								

Section 2 – Shift Patterns and Routes

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
2a	Do you usually work a fixed shift?	Not to be reported (Commercial Sensitivity)								
-	What hours do you usually work?	Not to be reported (Commercial Sensitivity)								
-	What shift pattern do you usually work?	Not to be reported (Commercial Sensitivity)								
2b	Which bus routes do you usually work on?	Not to be reported (Commercial Sensitivity)								
2c	How often do you work on these routes?	Not to be reported (Commercial Sensitivity)								

Section 3 – Your New Electronic Machine and Validator

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
3a	Thinking about the new ticket machine and validators you use on the bus, how strongly would you agree or disagree with the following statements?	They have has made my job easier	N/A	2.82	No Driver Survey in Phase 3	
				3		
				1.15		
		Ticket machine is well placed in the driver's cab		3.88		
				4		
				0.76		
		Validator is well placed for me to help people		3.67		
				4		
				0.98		
		They helps people board more quickly		2.57		
				2		
				1.19		
		They are reliable and always work		2.31		
				2		
				1.21		
		Validator is easy for people to use		3.17		
				4		
				1.08		

Section 3 – Continued

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
3b	Thinking of the ETM you use, how difficult or easy do you find each of the following tasks? (1 = 'Very Difficult', through to 10 = 'Very Easy')	Logging on	9.08	8.68	No Driver Survey in Phase 3	
			10	10		
			2.03	2.24		
		Updating the fare stage	9.22	9.06		
			10	10		
			2.11	2.06		
		Reading the ETM display	8.33	8.24		
			10	10		
			2.50	2.62		
		Pressing the buttons	8.61	8.05		
			10	9		
			2.17	2.63		
		Memorising what the buttons do	7.84	6.80		
			8	8		
			2.46	2.68		
		Issuing paper tickets	8.83	8.01		
			10	9		
			2.31	2.57		
		Issuing paper tickets with wallet	8.19	6.18		
			9	6		
			2.66	2.96		
		Changing ticket rolls	8.09	8.01		
			10	9		
			2.57	2.50		
		Unjamming the ticket roll	7.03	6.86		
			8	8		
			3.22	2.83		
		Scrolling menus or selecting tickets	7.86	6.31		
			8	7		
			2.53	3.21		
		Validating Smartcards	N/A	7.16		
			N/A	8		
			N/A	2.85		
		Processing Smartcard tickets	N/A	6.69		
			N/A	7		
			N/A	2.85		
3c	Are there any other ETM tasks you find difficult or easy to do?	Open question	No answers given	No answers given	No Driver Survey in Phase 3	

Section 3 – Continued

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
3d	Are there any ETM tasks you find time consuming? (1 = 'Very', through to 10 = 'Not at all')	Logging on	7.54	1.76	No Driver Survey in Phase 3	
			9	2		
			3.17	0.43		
		Updating the fare stage	9.20	1.94		
			10	2		
			1.91	0.23		
		Reading the ETM display	8.72	1.81		
			10	2		
			2.28	0.39		
		Pressing the buttons	8.67	1.73		
			10	2		
			2.20	0.44		
		Memorising what the buttons do	7.66	1.57		
			8	2		
			2.49	0.50		
		Issuing paper tickets	8.23	1.74		
			10	2		
			2.60	0.44		
		Issuing paper tickets with wallet	7.00	1.46		
			8	1		
			3.20	0.50		
		Changing ticket rolls	6.78	1.73		
			8	2		
			3.02	0.45		
		Unjamming the ticket roll	6.14	1.61		
			6	2		
			3.20	0.49		
		Scrolling menus or selecting tickets	7.97	1.39		
			8	1		
			2.53	0.49		
		Validating Smartcards	N/A	1.69		
			N/A	2		
			N/A	0.46		
		Processing Smartcard tickets	N/A	1.74		
			N/A	2		
			N/A	0.44		

Section 4 – Keeping to Time

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
4a	Putting aside traffic delays, do you find it easy to keep to the bus timetable?	Yes	133	80%	73	55%	No Driver Survey in Phase 3			
		No	34	20%	54	41%				
		No Answer	0	0%	6	5%				

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
4b	Which of the following do you think delays the bus?	Customers not having fare ready	2.31	2.34	No Driver Survey in Phase 3	
			1	2		
			2.5	1.49		
		Customers paying with notes	3.05	2.67		
			2	2		
			2.48	1.45		
		Lots of people boarding	4.54	2.99		
			4	3		
			2.56	1.39		
		Issuing paper tickets	7.13	3.35		
			8	3		
			2.61	1.51		
		Issuing paper tickets with wallet	4.79	3.17		
			4	3		
			2.97	1.46		
		Being unable to read passes or tickets	3.74	3.37		
			3	4		
			2.74	1.33		
		Finding the correct ticket on ETM	6.88	3.05		
			8	3		
			2.65	1.58		
		Passengers disputing fares or documents	4.9	3.46		
			5	3		
			2.83	1.65		
		Discussions with people about fares etc.	5.1	3.21		
			5	3		
			2.90	1.68		
		Passengers using Smartcards	N/A	3.43		
			N/A	4		
			N/A	1.89		

Section 5 – Safety and Security

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
5a	Please rank the following from 1 to 4, where 1 in your opinion is the greatest security risk	Carrying cash on the bus	1.58	1.71	No Driver Survey in Phase 3	
			1	1		
			0.91	0.97		
		Carrying cash to the depot	2.21	2.61		
			2	3		
			1.09	1.09		
		Carrying cash on a Monday or Tuesday	2.4	2.41		
			2	2		
			1.17	1.08		
		Passenger confrontation	2.91	3.28		
			3	4		
			1.05	1.05		
5b	Please rank the importance of the following improvements to safety and security, from 1 to 3	Less cash handling	1.31	1.38		
			1	1		
			0.63	0.70		
		Reliable way to validate a ticket or pass	2.11	2.38		
			2	3		
			0.84	0.84		
		Not accepting payment from large notes	1.97	2.01		
			2	2		
			0.80	0.74		

Section 6 – Fraud

Q'n No	Question	Answer	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
6a	How often do you encounter expired or fake tickets and passes?	0-2	57	58%	80	61%	No Driver Survey in Phase 3			
		3-4	25	25%	38	29%				
		5-6	12	12%	8	6%				
		7+	5	5%	6	5%				
6b	How many times each day does the ticketing equipment show an invalid ticket or pass when a Smartcard is used?	0-2	N/A		79	62%				
		3-4	N/A		31	24%				
		5-6	N/A		6	5%				
		7+	N/A		12	9%				
6c	Excluding Smartcards, what do you think is the most common method of passenger fraud?	Out of date tickets	46	62%	75	49%				
		Copied or fake tickets	3	4%	15	10%				
		Passing tickets back to others	1	1%	10	6%				
		Tickets from other operators	0	0%	3	2%				
		Over-riding	14	19%	40	26%				
		Rushing past the driver or hiding behind other boarders	10	14%	11	7%				
6d	Considering Smartcards only, what do you think is the most common method of passenger fraud?	Printed dates on smartcards have expired	N/A		37	31%				
		Paper counterpart doesn't match	N/A		19	16%				
		Smartcards passed back for others to use	N/A		12	10%				
		Equipment shows invalid Smartcard	N/A		53	44%				

Section 7 – About You

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
7a	Age	18-24	4	4%	6	5%	No Driver Survey in Phase 3			
		25-34	18	18%	20	16%				
		35-44	31	32%	45	36%				
		45-59	33	34%	44	35%				
		60+	12	12%	11	9%				
7b	Gender	Male	95	97%	123	98%				
		Female	3	3%	3	2%				

Travel Information Centre Survey

Section 1 – Employment

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
1a	How many years experience do you have?	0 - <2	2	33%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		2 - <4	0	0%						
		4 - <6	0	0%						
		6 - <8	0	0%						
		8 or more	4	67%						
1b	Do you work full or part time?	Full Time	4	67%						
		Part Time	2	33%						
1c	Is your role Clerical or Supervisory?	Clerical	4	67%						
		Supervisory	2	33%						

Section 2 – About You

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
2a	Age	18-24	0	0%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		25-34	2	33%						
		35-44	1	17%						
		45-59	2	33%						
		60+	1	17%						
2b	Gender	Male	0	0%						
		Female	6	100						

Section 3 – Selling Tickets

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
3a	Do you understand the ticket range used in Yorcard area?	Yes	4	67%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		Nearly all	0	0%						
		Some	1	17%						
		No	1	17%						

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
3b	How much do you agree with the following statements?	I sell the customer the ticket they ask for	1.00	No TIC Survey in Phase 2	No TIC Survey in Phase 3	
			1			
			0.00			
		I discuss the tickets available and then recommend a ticket	2.00			
			2			
			0.58			
		I discuss the tickets available and the customer decides	2.00			
			2			
			0.82			

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
3c	How often do you spend time discussing tickets with customers?	Every day	5	83%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		Once a week	1	17%						
		Less than once a week	0	0%						
		Never	0	0%						
3d	Do you find that customers are confused about tickets?	Yes	1	17%						
		No	4	67%						
3e	N/A									
3f	How often do you feel under pressure to serve customers quickly?	Often	0	0%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		Only when there are long queues	6	100%						
		Rarely	0	0%						

Section 4 – Using the Ticket & Pass Issuing Equipment

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
4a	How time consuming do you find logging into the systems?	1	0	0%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		2	3	50%						
		3	1	17%						
		4	2	33%						
		5	0	0%						
4b	Do you think that this process could be simplified?	Yes	0	0%						
		No	6	100%						
4c	N/A									
4d	On a scale of 1 to 5, how time consuming do you find it to enter data?	1	1	17%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		2	2	33%						
		3	0	0%						
		4	3	50%						
		5	0	0%						

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
4e	Thinking about issuing concession passes, please rank the following tasks in order of which you think are the most time consuming to the least	Verifying entitlement	2.00	No TIC Survey in Phase 2	No TIC Survey in Phase 3	
			2			
			0.45			
		Identifying the customer in eCRM	1.75			
			2			
			0.82			
		Making the pass	2.25			
			2			
			0.72			

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
4f	Do you think any of the above (4e) processes could be simplified?	Yes	0	0%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		No	4	100%						
4g	N/A									
4h	Do you experience any of the following problems when collecting information for issuing concession passes?	Postcode or address not in system	1	17%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		Wrong types of photos	3	50%						
		Applicants not having the right documents	6	100%						
		Applicants are not eligible	3	50%						
4i	Thinking of the problems you encounter in 4(h), do you think that the process for collecting information for a concessionary pass could be simplified?	Yes	0	0%						
		No	4	100%						

Section 5 – Payments

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
5a	On a scale of 1 to 5, how time consuming do you find it to take payments for tickets and passes?	1	1	17%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		2	1	17%						
		3	0	0%						
		4	2	33%						
		5	2	33%						

Q'n No	Question	Answer	Phase 1	Phase 2	Phase 3	Phase 4
			Mean	Mean	Mean	Mean
			Median	Median	Median	Median
			Std. Dev.	Std. Dev.	Std. Dev.	Std. Dev.
5b	Please rank the following in order of the most time consuming to the least.	People paying by chip and pin	1.80	No TIC Survey in Phase 2	No TIC Survey in Phase 3	
			2			
			0.84			
		Giving change for notes	2.60			
			3			
			0.55			
		Not having enough change	1.60			
			1			
			0.89			

Q'n No.	Question	Answer Categories	Phase 1		Phase 2		Phase 3		Phase 4	
			n	%	n	%	n	%	n	%
5c	Do you think any of the above (5b) processes could be simplified?	Yes	1	20%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		No	4	80%						
5d	N/A									
5e	On a scale of 1 to 5, how time consuming do you find it to offer refunds or exchanges for tickets?	1	1	17%	No TIC Survey in Phase 2		No TIC Survey in Phase 3			
		2	1	17%						
		3	1	17%						
		4	2	33%						
		5	1	17%						
5f	Do you think any of the above (5e) processes could be simplified?	Yes	1	25%						
		No	3	75%						

Notes