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REQUIREMENTS FOR A COMPUTERISED RAIL PASSENGER SERVICE INFORMATION SYSTEM

Introduction and Results of the Leeds Data

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Abstract

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This paper discusses a research project designed to contribute to the development of a computerised rail travel information system by providing information on the range and mix of inquiries made at railway stations, and on the effectiveness with which these inquiries are currently handled.

Results are given from a series of surveys undertaken at various times of the week and year at the inquiry office and telephone inquiry bureaux at Leeds station. A total of 576 inquiries from the former and 579 from the latter were analysed. Of these, the biggest single category related to train times, but nearly half wanted fares information as well or instead of this. Most passengers were inquiring about a relatively simple journey - two thirds of the answers involved no change of train and only 1.5% more than two changes. The mean time taken to answer an inquiry was less than a minute.

Further papers will analyse surveys undertaken at Euston, Woking, Doncaster, Gatwick Airport and Halifax, as well as a survey of users of the Prestel terminals at Kings Cross, and present overall conclusions from the project.

a: Introduction

The objective of this project was to contribute to the development of a computerised rail travel information system by providing information on the public needs, through an analysis of the range and mix of travel inquiries made at railway stations.

The method adopted was to examine passenger information requirements as served at present by existing manual methods, namely the public information desks and telephone inquiry bureaux. Discussions with a number of BR officers have suggested the following list of information as important in the categorisation of the type of information requested by the public. The division of inquiries between these various categories is of fundamental importance both in the design and implementation of any computer-based information system, and in the assessment of the likely benefits such a system might give:

1: Requests for local rail information or long distance travel information (and international travel), and the range of origins and destinations involved.

2: The time ahead of travel for information requests.

3: Requests which involve alternative routes, where there may be a trade-off between speed, cost, number of changes etc.

4: The extent to which journey time is constrained at arrival or departure.

5: The complexity of information requests, possibly proxied by the number of changes during the journey, or the number of timetables to be referred to.

6: The relative frequency of timetable information, fares information and both timetable and fares together.

7: Related to the above, information on railcards and other non-standard fares.

8: How many requests for information are so frequent that they are answered from the memory of the clerk?

9: How many requests are for other information (ie. not timetables or fares)?

b: Data collection methods.

The main task in the early stages of the project was to design a survey methodology for collection of data for the analysis of the pattern of public inquiries. A parallel project involving a PTE was known to be using tape-recordings of telephone enquiries (Maltby, 1984). This is undoubtedly the most satisfactory approach,in that it permits an exact backcheck of what was said, and the time taken. However, discussions with British Rail suggested that this would not be acceptable; in any event, extensions of the approach to public information desks would pose problems. The only practicable alternative appeared to be to place survey personnel next to enquiry clerks to note down details of enquiries made.

A one-day pilot study was arranged for Thursday May 17th ,1984 during which Dr. Whiteing, BR Research Fellow, spent some time with information staff at Leeds City station, working both at the information desk and the telephone inquiry bureaux. The primary purpose of this pilot study was to determine the suitability of a record sheet for collection of data on information requests. This had been designed in the light of advice received from BR management in several meetings to discuss plans for the project.

The record sheet was designed to collect origin and destination details related to each inquiry, and to allow categorisation of each request according to various dimensions discussed previously. A particular requirement was to note whether the request referred to timetable information, fares information, or to both (or neither) of these. Relevent boxes on the sheet can simply be ticked, or further details can be noted if time and space permit. The format of the record sheet allocates one complete line to each request for information, with approximately fifteen inquiries per page. (see Appendix 1 for record sheet)

c: Location and times.

Itwas felt that the survey should probably be undertaken in 2 hour stints, and that each location should include 2 hours of each of the following characteristics:

1: Weekday (Tues-Thurs) am.
2: Weekday (Tues-Thurs) pm.
3: Friday am.
4: Friday pm.
5: Saturday am or pm.

In addition, the Leeds surveys were repeated at differing times of the year, including the Friday before a Bank Holiday and the week after the introduction of timetable amendments.

The following locations were surveyed:

1: Leeds inquiry desk.
2: Leeds telephone inquiry bureaux.
3: Halifax.
4: Euston inquiry desk.
5: Euston telephone inquiry bureaux.
6: Doncaster inquiry desk.
7: Doncaster telephone inquiry bureaux.
8: Woking inquiry desk.
9: Woking telephone inquiry bureaux.
10: Gatwick Airport inquiry desk.

It was felt that this gave a reasonable range of types of location, from a major London terminal, Euston, down to a small provincial station, Halifax.

(Halifax has no separate inquiry desk and inquiries are answered at the ticket office.)

The data for Leeds and Halifax station were collected by staff members of the Institute; the rest of the surveys were undertaken on our behalf by Transmark.

d: Results of the Leeds surveys

The data for all stations have been collected and edited. In this section we will discuss the results of analyses of the Leeds data.

Data analyses have concentrated on the nature of these telephone bureaux and information desk inquiries. They fall into 7 broad areas: firstly general characteristics such as range of information, secondly range of Origin and Destination, thirdly complexity of inquiry, fourthly how far ahead the passengers are planning their journeys, fifthly day of the week involved, sixthly range of fare inquiry, and finally average time taken to answer each inquiry.

Some 15% of all enquiries related to matters other than train times and fares. These have been excluded from the subsequent analysis.

d.1: Range of information.

Overall there were 579 telephone inquiries at Leeds station. Table 1 illustrates the range of inquiries for different survey days while Table 2 shows their relative importance.

Date	Total	Timetable only	Fare only	Timetable and Fare
18/07	102	47	26	29
23/08	116	64	18	35
24/08	104	60	23	21
16/10	172	106	25	40
24/10	84	53	9	22
Total	579	331	101	147

Table 1: Frequency of range of information by date. (Telephone bureaux)

Date	Total	Timetable only	Fare only	Timetable and Fare
18/07	100	46.08	25.49	28.43
23/08	100	54.71	15.38	29.91
24/08	100	57.69	22.12	20.19
16/10	100	62.21	14.53	23.26
24/10	100	63.10	10.71	26.19
Total	100	57.17	17.44	25.19

Table 2: Relative importance of range of inquiries by date. (Telephone bureaux)

Inquiries relating to timetables only were the most numerous accounting for 57 percent of all inquiries, followed by inquiries relating to a combination of timetable and fare inquiries, which accounted for 25 percent and finally fares only which accounted for 17 percent of all inquiries. The variations of frequency in the columns of table 1 are related to variation of day of the week, time of day and month of the surveys.

At the information desk there were 576 inquiries overall. Table 3 details the frequency of various inquiry types for different days of the survey while Table 4 shows their relative importance. As we expected, inquiries related to timetables only were the most numerous, accounting for 54 percent of all inquiries. In contrast to telephone bureaux this was followed by inquiries relating to fare only accounting for 27 percent of all inquiries, and finally a combination of timetable and fare which accounted for 19 percent of all inquiries.

Date	Total	Timetable	Fare	Timetable and Fare
17/07	89	45	24	20
20/07	94	47	27	20
23/08	69	33	21	15
29/08	104	55	32	17
17/10	142	80	37	25
26/10	78	49	15	14
Total	576	309	156	111

Table 3: Frequency of range of information by date.
(Information desk)

Date	Total	Timetable only	Fare only	Timetable and Fare
17/07	100	50.56	26.97	22.47
20/07	100	50.00	28.72	21.28
23/08	100	47.83	30.43	21.74
29/08	100	52.88	30.77	16.35
17/10	100	56.34	26.06	17.60
26/10	100	62.82	19.23	17.95
Total	100	53.65	27.08	19.27

Table 4: Relative importance of range of inquiries by date. (Information desk)

Table 5 demonstrates the overall frequency distribution of range of inquiries for different information points while Table 6 shows their relative frequency. Timetable inquiries only was the most frequent information which passengers are seeking and accounted for 55 percent of all inquiries. Overall, inquiries relating to fare only and combination of timetable and fare inquiries each accounted for 22 percent.

It is significant that nearly a half of all enquiries involve fares information. Also, it appears that fares inquiries may be more important in summer, perhaps when irregular leisure trips are being planned, so that our surveys at other stations may well have understated the proportion. Clearly, a computerised system would be of most value if it incorporated fares as well as timetable information.

Date	Total	Timetable only	Fare only	Timetable and Fare
Telephone bureaux	579	331	101	147
Information desk	576	309	156	111
Total	1155	640	257	258

Table 5: Frequency of range of information by information points.

Date	Total	Timetable only	Fare only	Timetable and Fare
Talephone bureaux	100	57.17	17.44	25.39
Information desk	100	53.65	27.08	19.27
Total	100	55.41	22.25	22.34

Table 6: Relative frequency of range of information by information points.

d.2: Range of Origin and Destination.

As described in section (a) the ranges of Origin and Destination play a very important role in the design of any computerised passanger information system. Table 7 gives detailed information about the ranges of Origin and Destination in Leeds station by different information points. Origins and Destinations are defined as "Leeds", "local", (for detail and station names see Appendex 2) and "other".

Origin	Total		Telephone bureaux		Information desk	
	F	%	F	%	F	%
Leeds to Local	120	10.39	52	8.98	69	11.81
Local to Leeds	36	3.12	30	5.18	6	1.04
Leeds to Other	643	55.67	270	46.63	373	64.76
Other to Leeds	177	15.32	96	16.38	81	14.06
Local to Local	24	2.08	22	3.80	2	0.35
Local to Other	78	6.75	63	10.88	15	2.60
Other to Local	30	2.60	22	3.88	8	1.39
Other to Other	47	4.07	24	4.15	23	3.99
Total	1155	100	579	100	576	100

Table 7: Range of Origin and destination by information points.

As expected, inquiries related to long distance journeys starting at Leeds station (row "Leeds to Other") are the most frequent, accounting overal for 56 percent of inquiries. The passengers making such inquiries at telephone bureaux comprise 47 percent of total telephone inquiries while the same inquiries accounted for 65 percent of total inquiries at the information desk. These results show that most of the passengers coming to the information desk intended to make journeys originated from Leeds station, but in telephone bureaux inquiries are for wider range of Origin. (eg. Local to other destinations in telephone bureaux is 11 percent of all inquiries while from the information desk it is 3 percent of all inquiries.

Were a computerised information system only able to deal with journeys to or from Leeds station, this sort of system will give answers to 92 percent of all inquiries at the information desk and 77 percent of all inquiries at telephone bureaux. Overall it will therefore answer to 84 percent of all inquiries.

If the passenger information system is based on Leeds and Local stations, it will answer 96.01 percent of all inquiries at the information desk and 95.85 percent of all inquiries at telephone bureaux. Overall it will thus answer 95.93 percent of all inquiries at Leeds station.

The total number of stations involved in the 1155 inquiries was over 400.

d.3: Complexity of inquiry.

"Complexity of inquiry" is measured basically by the number of changes of train involved. Clearly it is for the more complex inquiries that the speed and accuracy of a computerised system would offer greatest benefit.

The frequency of journeys involving different numbers of changes for each data collection point is given in Table 8 and its relative frequency is given in Table 9. These tables are derived from answers given by the clerk; in general, it appeared to us that clerks suggested through trains whenever possible, unless specifically directed to look for a faster or an earlier or later train. Nethertheless, it is significant that 98 percent of the journeys involved no more than two changes. Whilst very complicated journeys do occur, they appear to be the exception than the rule.

Data Collection point	Total	Number of changes				
		0	1	2	3	4
Telephone bureaux	450	319	101	24	3	3
Information desk	398	255	105	31	5	2
Total	848	574	206	55	8	5

Table 8: Frequency of number of changes by data collection point.

Data Collection point	Total	Number of changes				
		0	1	2	3	4
Telephone bureaux	100	70.89	22.44	5.33	0.67	0.67
Information desk	100	64.07	26.38	7.79	1.26	0.50
Total	100	67.69	24.29	6.49	0.94	0.59

Table 9: Relative frequency of number of changes by data collection points.

d.4 Journey constraints

The constraints on which we collected information were the following:

1: The inquirer seeks to depart from origin station at a certain time of the day. Or

2: He wishes to arrive at the destination station at a certain time of the day. Or

3: He requested a through train. Or

4: Combination of the above.

The frequency distribution of journey constraints for each data collection point is given in Table 10, and its relative frequency is given in Table 11.

Location	Total	Dep	Arr	Thr	Dep & Arr	Dep & Thr	Arr & Thr	No constraint
Phone *	450	309	45	13	3	48	8	24
Desk *	398	249	45	18	0	36	5	45
Total	848	558	90	31	3	84	13	69

Table 10: Frequency of constraint journey time by data collection points.

* Phone equals Telephone bureaux and Desk equals Information desk.

Location	Total	Dep	Arr	Thr	Dep & Arr	Dep & Thr	Arr & Thr	No constraint
Phone *	100	68.67	10.0	2.89	0.67	10.67	1.77	5.33
Desk *	100	52.56	11.36	4.52	0.0	9.05	1.25	11.31
Total	100	65.80	10.51	3.61	0.35	9.90	1.55	8.13

Table 11: Relative frequency of journeyconstraints by data collection points.

At the telephone bureaux inquiries relating to constrained journeys accounted for 94 percent of all timetable inquiries, and departure time constraint is the most numerous one accounting for 78 percent of all timetable inquiries. In addition, requests for the next train - although not coded as departure time constraints, do reflect a desired departure time. These form the bulk of the unconstrained journeys. But at the information desk constrained journeys accounted for 88 percent of all timetable inquiries, and departure time constraint accounted for 62 percent of all timetable inquiries. Around 12% of passengers specifically requested a through train; 10% specified arrival time constraints.

Overall table 11 shows that those passengers making inquiries by ringing the telephone bureaux constrained their inquiries more than those making inquiries by attending the information desk.

d.5: How far ahead the passengers are planning their journeys.

First we have to specify the relation between journey date and date of inquiry. How long before journeys the passengers are making inquiries about them is important for any computerised passenger information system, in order to know how far in advance information on timetable changes must be available.

Table 12 gives detailed frequency distributions of categories of time ahead by data collection points, while table 13 shows their relative frequency.

Location	Total	Same day	next day	Within 2-4 day	5-7 day	8-10 day	11-14 day	15+ day
Phone*	319	81	75	86	37	16	3	21
Desk*	297	101	54	45	34	17	18	28
Total	616	182	129	131	71	33	21	49
				331		54		

Table 12: Frequency distribution of categories of time ahead by data collection point.

Location	Total	Same day	next day	Within 2-4 day	5-7 day	8-10 day	11-14 day	15+ day
Phone*	100	25.39	23.51	26.96	11.60	5.02	0.94	6.58
Desk*	100	34.01	18.18	15.15	11.44	5.72	6.06	9.43
Total	100	29.55	20.94	21.27	11.53	5.26	3.41	7.95
				53.73		8.67		

Table 13: Relative frequency distribution of categories of time ahead by data collection point.

At the information desk, same day timetable inquiries were the most frequent accounting for 34 percent of all inquiries, followed by next day timetable inquiries which accounted for 18 percent; 2 to 4 days ahead which accounted for 15 percent. But at the telephone bureaux timetable inquiries refering to same day, next day, and within 2 to 4 days ahead have more or less the same magnitude, accounting for about 25 percent each.

Overall, same day timetable inquiries accounted for 30 percent of all timetable inquiries, within next week timetable inquiries accounted for a further 54 percent of all timetable inquiries, within 8 to 14 days ahead timetable inquiries accounted for 9 percent of all timetable inquiries, and more than 14 days ahead accounted for 8 percent.

In the light of the above, we conclude that amendments or new timetables should be available at least 14 days before introduction, to enable the passenger information system to answer about 92 percent of all timetable inquiries.

d.6: Days of the Week.

The detailed frequency distribution of days of the week about which the passengers are making inquiries with respect to data collection points are presented in Table 14, and their relative frequency distribution are presented in Table 15. Enquiries relating to the same day are excluded, but the results may still be biassed by the fact that our surveys only took place on certain days of the week.

Location	Total	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mid week
Phone	213	13	11	3	6	29	23	22	106
Desk	195	12	6	7	8	20	31	18	93
Total	408	25	17	10	14	49	54	40	199

Table 14: Frequency ditribution of week days by data collection points.

Location	Total	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Unspecified working day
Phone	100	6.10	5.16	1.41	2.82	13.62	10.79	10.33	49.77
Desk	100	6.15	3.08	3.59	4.10	10.26	15.90	9.23	47.69
Total	100	6.13	4.17	2.45	3.43	12.01	13.24	9.80	48.77

Table 15: Relative frequency distribution of week days by data collection points.

The most important point here is to know how many inquiries relate to Sundays, when engineering work often leads to short-term retiming of trains. About 10 percent of enquiries fall into this category.

d.7: Range of Fare Enquiry

Overall, 248 enquirers rang the telephone inquiries office to make 301 inquiries about the range of fares; 267 passengers approached the information desk where they made 303 inquiries about different fare categories. Table 16 shows the detailed frequency of each fare category with respect to data collection points, while Table 17 shows the relative frequency.

Location	Total	Ord. Sing.	Ord. Ret.	Day Ret.	W/E Ret.	Saver	Rail Card	Other
Telephone	301	36	73	81	41	37	21	12
Desk	303	37	72	62	29	58	39	6
Total	604	73	145	143	70	95	60	18

Table 16: Frequency of Fare catagory

Location	Total	Ord. Sing.	Ord. Ret.	Day Ret.	W/E Ret.	Saver	Rail Card	Other
Telephone	100	11.96	24.25	26.91	13.62	12.29	6.98	3.99
Desk	100	12.22	23.76	20.46	9.57	19.14	12.87	1.98
Total	100	12.09	24.01	23.68	11.58	15.73	9.93	2.98

Table 17: Relative Frequency of Fare category

Overall, "ordinary return" and "day return" are the most popular categories which account for 24.01 percent and 23.68 percent of all fare inquiries respectively. The rest have more or less the same magnitude, accounting for between 9.93 and 15.73 percent of all fare inquiries, except other reduced fares which accounted for only 2.98 percent of all fare inquiries.

d.8: Average time taken to answer each inquiry.

In this section we examine the average time taken for the clerk to answer category of inquiries with respect to each data collection points. Although the recording of time taken was rough, we should expect the averages to be reasonably accurate.

Table 18 gives detailed information about the total frequency of each category of inquiries by data collection points, and the average time taken to answer it. At the same time this table gives the same information for the cases when the clerk did not refer to any printed or other material in order to answer the question.

Location		Total		Timetable		Fare		Timetable & Fare	
		F	T	F	T	F	T	F	T
Phone	all	579	0.70	331	0.64	101	0.68	147	0.85
	mem	81	0.56	33	0.61	16	0.47	32	0.57
Desk	all	576	0.76	309	0.70	156	0.78	111	0.79
	mem	46	0.57	22	0.54	11	0.55	13	0.62
Total	all	1155	0.73	640	0.67	257	0.74	258	0.80
	mem	127	0.57	55	0.58	27	0.51	45	0.58

Table 18: Frequency and time taken (mins) for each category. "mem" refers to answers given without reference to printed or other sources.

As we expected on average the time taken to answer any inquiry about combinations of timetable and fares is the highest one, especially at telephone bureaux. Fare only enquiries appear to take slightly longer the timetable only enquiries, except when answered entirely from memory. What is noteworthy is that the average enquiry appears to take only some 50 seconds. Judging by the comparison between this figure and that for enquiries answered solely from memory, it would appear that only some 15 seconds of this is spent consulting sources. The rest of the time is devoted to interaction with the customer.

d.9 Conclusions from the Leeds surveys

We may summarise the results of the Leeds surveys as follows:

1. Nearly a half of all inquiries require fares information as well as or instead of train times.

2. Most of the enquiries relate to fairly simple journeys; only 1.5% involve more than two changes of train.

3. Most passengers (75%) give a desired departure time; around 14% specify that they want a through train and some 12% specify a desired arrival time.

4. 30% of inquiries relate to the same day, and a further 54% to the same week. 8% of inquiries relate to more than 14 days ahead.

5. 10% of inquiries relate to Sunday travel.

6. The mean time taken for all inquiries is some 50 seconds, of which only 15 seconds is spent consulting material.

Before we consider the implications of these findings for a computerised passenger information system, we need to know how typical they are. Results of the other surveys, and overall conclusions, will be reported in subsequent papers.

Reference

D Maltby (1984) Feasibility Study of the Use of Computer-Based Referencing Facilities for Answering Telephone Inquiries About Local Public Transport Services. (University of Salford, unpublished).

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APPENDIX 1

P A S S E N G E R I N F O R M A T I O N S U R V E Y

D A T E : L O C A T I O N : T I M E : S H E E T N O :

NAME OF STATION		TIMETABLE								FARE									
		Date of Journey	Constraint			Given		No. of Changes	Alternative Route	M	Ord Sin Ord Ret	Day Ret W/E Ret	Saver	Rail Card	Other Red. Fare	1st Cls.	M	Seat Resv.	Other	Comment
Origin	Destination		Dep.	Arr.	Thro.	Dep.	Arr.													

APPENDIX 2

ALTOFTS

ATTERCLIFFE ROAD

BAILDON

BARNSLEY

BATLEY

BEN RHYDDING

BINGLEY

BOLTON-ON-DEARNE

BRADFORD EXCHANGE

BRADFORD FORSTER SQUARE

BRAMLEY (W. YORKS)

BRIGHTSIDE

BROCKHOLES

BURLEY-IN-WHARFEDALE

CASTLEFORD

CATTAL

CHAPELTOWN

CHURCH FENTON

CLAYTON WEST

CONISBROUGH

CROSS GATES

DARTON

DENBY DALE

DEWSBURY

EASTRINGTON

ELSECAR

GARFORTH

GILBERDYKE

GOOLE

GUISELEY

HALIFAX

HAMMERTON

HARROGATE

HEADINGLEY

HEBDEN BRIDGE

HEMSALL

HONLEY

HORSFORTH

HOWDEN

HUDDERSFIELD

ILKLEY

KEIGHLEY

KNARESBOROUGH

KNOTTINGLEY

LEEDS CITY

LOCKWOOD

MARSDEN

MENSTON

MEXBOROUGH

MICKLEFIELD

MIRFIELD

MOORTHORPE

MORLEY

MYTHOLMROYD

NEW PUDSEY

NORMANTON

PANNAL

PENISTONE

PONTEFRACT BAGHILL

PONTEFRACT MONKHILL

POPPLETON

RAVENSTHORPE

RAWCLIFFE

ROTHERHAM

SALTMARSHE

SELBY

SHEFFIELD

SHEPLEY

SHIPLEY

SKELMANTHORPE

SKIPTON

SNAITH

SOUTH ELMSALL

SOUTH MILFORD

SOWERBY BRIDGE

STARBECK

STOCKSMOOR

TODMORDEN

ULLESKELF

WAKEFIELD KIRKGATE

WAKEFIELD WESTGATE

WEETON

WHITLEY BRIDGE

WOMBWELL

WOODLESFORD

WRESSLE

YORK