

Commuters' Perceptions of Metropolitan Train Services in Melbourne

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1.0 Introduction

Victorian media is focusing its attention on the safety, punctuality and reliability of the public transport service in Melbourne. For example, the Age newspaper reports (on 25 April 2007) that commuters are being left behind on platforms of some of Melbourne's busiest inner and middle-suburban stations because of overcrowding on the rail system. The Herald Sun (on 16 Aug 2006) claims that robberies, weapon carrying, bicycle theft and harassment on public transport have risen over the past year.¹ Channel Seven's Today Tonight programme on 15 May 2007 reported that road congestion across Victoria is forcing some motorists to spend up to four hours in their cars travelling to and from work. Dr Paul Mees from Melbourne University claims in the report that road congestion is due to the State government neglecting public transport infrastructure and services. This study examines the passengers' perceptions of metropolitan train services in Melbourne² to contribute to this debate to improve the quality of train services in Melbourne.

Several studies have examined the quality of transport services around the world (see for example, Hanna and Drea (1998), Drea and Hanna (2000), Tripp and Drea (2002), Koushki et al. (2003), and Cavana, Corbett and Lo (2007)). Hanna and Drea (1998) examine commuters' preferences when choosing between Amtrak train services and automobile services to travel between cities. They find that automobile comfort and lack of timetable information adversely affect commuters' likelihood to choose Amtrak train services. Moreover, they find that the following factors help commuters to choose Amtrak train services than automobile services to travel between cities: cost of Amtrak; ability to work in transit; convenience of Amtrak stations; convenience of station to destination; pleasantness of the station as a place to wait; and convenient departure/return times. Koushki et al. (2003) examine management awareness of passenger priorities and passenger satisfaction of transport services in Kuwait and find that transport managers' perceptions of passengers needs do not accurately reflect actual passenger needs. They argue that lack of compatibility between passenger needs and managements' perception of those needs could result in the misallocation of scarce resources and growing passenger dissatisfaction with transit services.

This study attempts to investigate customers' perceptions of metropolitan train services in Melbourne to identify areas that need improvements to enhance the overall customer satisfaction.

The plan of this paper is as follows. Section 2 discusses the research design and methodology used to analyse passengers' perception of the quality of the transport service. Section 3 presents the empirical results of univariate test statistics, factor analysis and regression analysis. Finally, the conclusions are presented in Section 4.

2.0 Methodology

The Public Transport Division of the Department of Infrastructure conducts customer satisfaction survey on users of trams, metropolitan buses, metropolitan trains, metropolitan taxis, v/line trains and v/line coaches in Melbourne using telephone interviews. The sample is randomly selected from electronic telephone directories in areas where services operate. The present study is limited to Metropolitan train services. The sample size of the respondents is 30,834. The sample size is spread evenly over four quarters of each year (around 3,400 passengers each year) over the nine years from 1998 to 2006. The number of responses for each year from 1998 to 2006 for total sample as well as subgroups based on gender, age, frequency of travel and time traveled are given below in Table 1. The respondents were asked various questions related to value for money, information, service

¹ The number of harassment reports went up 16.7%; bicycle theft was up 15.4%; drug possession and use went up 13.6%; property damage was up 13%; and incidents involving the carrying of weapons went up 11.6%.

² Metropolitan Melbourne's rail system incorporates 15 electrified lines radiating from an underground CBD loop, and in 1999 it carried 126 million passengers in 907 EMU carriages (Mees (2005, p434)).

delivery, comforts (related to amount of space, seating, cleanness, heating and cooling), staff courteousness, staff helpfulness, safety, station and ticketing as well as overall satisfaction on the quality of metropolitan train service. One of the limitations of this study is that the satisfaction survey does not include any specific question on crowding trains. The respondents were asked to indicate whether they were satisfied or dissatisfied using a seven point Likert scale as follows: totally satisfied – 7, very satisfied – 6, somewhat satisfied – 5, don't know – 4, somewhat dissatisfied – 3, very dissatisfied - 2 and totally dissatisfied - 1.

3.0 Results and Discussion

The results are presented in three sections using univariate analysis, factor analysis and regression analysis.

3.1 Univariate Analysis

Table 2 reports the mean and median ratings on overall satisfaction of quality of Melbourne train service for the total sample and various sub-samples based on gender, age, frequency of travelling, the period of time travelled and each year. The mean and median score on overall satisfaction of train service for the total sample is 5.28 and 6.00 respectively. We do not find any significant difference in overall satisfaction between male (mean=5.29, median=6.00) and female (mean=5.26, median=6.00) ratings. However, there are differences in overall satisfaction amongst various age groups – overall satisfaction is stronger for youngest and oldest age groups than others: 16 - 24 years old (mean=5.43, median=6.00) and 55 years and over (mean=5.52, median=6.00) whereas: 25 – 34 years (mean=5.10, median=5.00), 35 – 44 years (mean=5.09, median=5.00) and 45 – 54 years (mean=5.08, median=5.00). Overall satisfaction is low for regular travellers and least frequent travellers than other less frequent travellers: mean (median) scores of passengers travelling on the train more than 2 days per week is 5.06 (5.00), travelling on the train less than once a year is 5.03 (5.00) whereas less frequent travellers of one day a week is 5.45 (6.00), 1-3 days a month is 5.44 (6.00) or once a year is 5.37 (6.00). Overall satisfaction of the passengers who travel during peak time on weekdays is significantly lower than others: mean (median) score for passengers travelling on peak time is 5.08 (5.00), whereas travelling on off peak time on weekdays is 5.48 (6.00), travelling on nights is 5.34 (6.00) and travelling on weekend is 5.49 (6.00). Overall satisfaction is significantly lower during the period 2004-2006 than 1998-2003.

To further investigate the factors that contribute to this overall customer satisfaction levels and to identify areas for improvements, we examine the various attributes of the quality of the train service. Table 3 provides mean and median ratings of responses for each of these attributes for the total sample as well as for sub groups based on gender, age, frequency of travelling and the period of time travelled. Table 4 provides mean ratings of responses for each of these attributes for the total sample.³

In general, overall median response is 6 (very satisfied) for “timetable information”, “train on time”, “operation hours”, “heating in winter” and “staff appearance”, reflecting high levels of satisfaction. However, the questions related to “visibility around station”, “visibility after dark”, “loutish behaviour”, “police availability”, “train safety after dark”, “station safety after dark”, and “car park surveillance” received mean scores of less than 4 and median score of 4 or less. This result is consistent across various sub groups. This indicates that passengers are dissatisfied with safety related issues. Other variables related to cleanliness, “train cleanliness” and “graffiti on trains”, received mean scores of less than 4.5, indicating dissatisfaction with cleanliness. Generally, it is also seen from Table 3, females tended to rate safety related attributes, comforts and facilities lower than males. This includes lighting, frequency at peak time, clarity of announcement, cooling in summer, number of cancellation, graffiti on trains, frequency weekends, train cleanliness, comfort when not seated, frequency at night, cancellation information, visibility other times, platform surveillance, ticket vending machines, visibility around station, train safety after dark, station safety after dark, car park surveillance, and loutish behaviour.

Commuters' perceptions also differ among age group. Younger (16-24 years) and oldest age group of over 55 years rank heating in winter, timetable information, number of announcements, station

³ We do not provide median responses for each year to conserve space.

cleanliness, staff courteousness, seat comfort and staff helpfulness strongly than others. The casual travellers who use the train once a year or less rated most of the attributes less strongly than others. The weekday peak hour travellers gave lower ratings for heating in winter, number of announcements, train on time, amount of space, frequency weekends, frequency nights, cancellation information, ticket vending machines and loutish behaviour. Night travellers gave a lower score for operation hours, number of announcements, train safety after dark, loutish behaviour and visibility after dark, but interestingly they gave higher ratings than others to lightings, frequency at peak time, frequency at nights and for cancellation information.

As can be seen in Table 4, average ratings for questions related to service delivery, facilities and value for money have declined over the years whereas average ratings for questions related to safety issues have improved, indicating the significant improvement needed in service delivery and facilities. Improvement in service delivery and facilities will enhance the perception of value for money.

To further investigate the impact of these results on overall customer satisfaction and to target areas for improvements, factor analysis was conducted and the results are discussed in the following section.

3.2 Factor Analysis

A seven factor model was developed using all questions related to customer satisfactions. The results are reported in Table 5. Table 5 shows 50.32% of the variation in survey responses is explained by this seven factor model. The seven factors are summarised and named as follows:

- Factor one focussed on safety related variables: train safety after dark, station safety after dark, police availability, loutish behaviour, visibility after dark, car park surveillance and platform surveillance. This factor is labelled as “SAFETY” and explained 24.99% of the variance.
- The second factor placed a heavy emphasis on variables related to comfort. This was named “COMFORT”. This factor explained 6.45% of the variance.
- The third factor had high loadings in the variables related to frequency of services. This factor is labelled “SERVICE DELIVERY” and explained 4.70% of the variance.
- The fourth factor had high loadings on variables related to facilities. This factor is labelled “FACILITIES” and explained 4.19% of the variance.
- The fifth factor had high loadings on variables related to staff. This factor is labelled “STAFF IMPACT”. This factor explained 3.64% of the variance.
- The sixth factor had high loadings on variables related to information. This factor is labelled “INFORMATION”. This factor explained 3.44% of the variance.
- The seventh factor had high loadings on variables related to ticketing. This factor is labelled “TICKETING” and explained 3.21% of the variance.

Parametric ANOVA test and non-parametric Kruskal-Wallis test statistics shows that the factors identified varies significantly between groups based on gender, age, travel frequency and travelling time. Moreover, the factor analysis shows that the factor “SAFETY” explains the 24.99% variation in the seven factor model developed. The average satisfaction score to all variables related to “SAFETY” (train safety after dark, station safety after dark, police availability, loutish behaviour, visibility after dark, car park surveillance and platform surveillance) are less than 4.5. Each of the other factors “COMFORT”, “SERVICE DELIVERY”, “FACILITIES”, “STAFF IMPACT”, “TICKETING” and “INFORMATION” explain less than 7% of variance. We also find that the average response on the variable related to the factor TICKETING: ticket vending machines; variables related to the factor SERVICE DELIVERY: frequency of service at nights and frequency of trains service; the variables related to the factor COMFORT: train cleanliness, comfort when not seated and graffiti on trains; variables related to the factor SERVICE DELIVERY: frequency of service at nights and frequency of trains service; and variable related to the factor INFORMATION: cancellation information are less than 4.5.

Synthesising all of these, we argue that SAFETY related issues is major concern to commuters on their perception of the quality of train service in Melbourne. Improvement on safety related aspects and other aspects ranked lower by the commuters will help to improve the perception on overall satisfaction on the quality of the train service.

3.3 Regression Analysis

In order to understand the factors that contributed to this overall satisfaction and identify the improvements necessary to improve the satisfaction rating, we have used regression analysis to examine the relationship between overall satisfaction of passengers and the factors developed in section 3.2.

As can be seen in Table 6, all factors are statistically, significantly and positively related to overall satisfaction of the quality of the Melbourne train service. The magnitude of the coefficients for the factors "SERVICE DELIVERY" and "COMFORT" are high with 0.55 and 0.43 respectively. Considering that the average response on the variables related to the factor COMFORT: train cleanliness, comfort when not seated and graffiti on trains; and variables related to the factor SERVICE DELIVERY: frequency of service at nights and frequency of trains service are less than 4.5, improving these aspects will increase the overall satisfaction of the quality of the train service in Melbourne.

However, the magnitude of the coefficients for the factors "SAFETY", "FACILITIES" and "STAFF IMPACT" are very small with the coefficients of 0.18, 0.13 and 0.10 respectively. The average commuters' response on all the variables related to the factor "SAFETY" is less than 4.5. The "SAFETY" factor explains the 24.99% of the variance on the seven factor model developed on commuters' responses. We argue that improving the aspects related to safety in the train service in Melbourne will improve the commuters' response on their satisfaction on safety related aspects as well as overall satisfaction of the quality of the train service. We also argue that this will increase the magnitude of the coefficient of "SAFETY" in the regression analysis. The average commuters' response on the variables related to the factor STAFF IMPACT: visibility around station and visibility other times; and the variable related to the factor TICKETING: ticket vending machines are less than 4.5. Improving these aspects will improve the commuters' response on their satisfaction on STAFF IMPACT and TICKETING related aspects as well as overall satisfaction of the quality of the train service.

Moreover, the average ratings for questions related to service delivery and facilities have declined over the years. Thus, improving the quality of service delivery and facilities will significantly improve the overall satisfaction of the train service.

4.0 Conclusion

This study examines passengers' perception of the quality of train services in Melbourne using univariate analysis, factor analysis and regression analysis. We found that overall satisfaction on the quality of service is lower during the period 2004-2006 than during 1998-2003. We also found that ratings on service delivery and facilities have declined in recent years. Using factor analysis, we identified the following factors that contribute to satisfaction with the quality of the train service: "SAFETY", "COMFORT", "SERVICE DELIVERY", "FACILITIES", "STAFF IMPACT", "TICKETING" and "INFORMATION", and documented that passengers' major concern is "SAFETY" related issues.

We used these factors in a regression analysis to identify the relationship between these factors and overall satisfaction with train service. We find that the magnitude of the coefficients for the factors "COMFORTS" and "SERVICE DELIVERY" are very high whereas the magnitude of the coefficients for "SAFETY", "FACILITIES" and "STAFF IMPACT" are very low.

We also find that the average response on (a) all the variables loaded into the factor "SAFETY"; (b) the variable related to the factor TICKETING: ticket vending machines; (c) variables related to the factor SERVICE DELIVERY: frequency of service at nights and frequency of trains service; (d) the variables related to the factor COMFORT: train cleanliness, comfort when not seated and graffiti on trains; and (e) variables related to the factor SERVICE DELIVERY: frequency of service at nights and frequency of trains service; and (f) variable related to the factor INFORMATION: cancellation information are less than 4.5. Improving these aspects will enhance the commuters' perception on the quality of the train service. However, one of the limitations of this study is that this survey does not include any specific questions regarding crowding on trains or waiting times. Thus, further study is warranted on the overcrowding to make more informed decisions about upgrading or improving the rail net work.

The customer satisfaction survey is only one indicator of customer views. There are other factors, such as customers' complaints and suggestion for improvements, which are to be considered before

allocation of resources. Nevertheless, it is possible to take customer perceptions into account when making decisions which have an impact on passenger services.

References

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Table 1: Description of the Sample

Panel A								
Year	Respondents (N)	Gender (%)		Age group (%)				
		M	F	16-24	25-34	35-44	45 -54	55+
1998	2834	41.7	58.3	24.9	17.9	18.8	14.3	24.1
1999	3471	40.4	59.6	23.7	17.0	18.0	15.4	25.8
2000	3534	42.0	58.0	21.6	17.0	19.3	16.2	25.9
2001	3476	42.2	57.8	21.3	18.8	18.1	16.8	25.0
2002	3487	42.8	57.2	21.0	18.3	18.9	16.5	25.3
2003	3476	42.0	58.0	21.0	17.4	17.0	17.7	26.8
2004	3545	41.2	58.8	17.6	17.9	17.5	17.5	29.5
2005	3534	42.6	57.4	18.8	17.1	16.3	18.3	29.5
2006	3477	41.5	58.5	15.7	14.6	17.7	18.7	33.3
Total	30834	41.8	58.2	20.5	17.3	17.9	16.9	27.3

Panel B									
Year	Frequency of train use (%)					Time travelled (%)			
	2 days per week	1day per week	1 to 3 days per month	1day per year	Less than 1 day per year	Weekday Peak	Weekday Off-Peak	night	weekend
1998	39.0	10.6	34.5	15.2	0.7	45.2	36.2	2.6	13.9
1999	39.0	10.5	33.9	16.2	0.5	44.7	37.7	3.2	12.0
2000	40.0	9.9	33.0	17.1	0.0	46.6	35.9	3.0	11.8
2001	39.8	10.0	33.3	16.8	0.0	44.0	34.9	3.3	13.6
2002	41.1	8.7	33.8	16.3	0.0	47.8	32.3	3.2	12.4
2003	40.4	9.3	33.7	16.6	0.0	46.4	33.8	3.5	12.2
2004	42.2	8.5	34.4	14.9	0.0	49.0	35.2	2.7	9.4
2005	42.7	8.0	34.9	14.5	0.0	48.2	34.1	2.5	10.9
2006	39.7	10.3	32.7	17.3	0.0	45.5	35.3	2.7	12.7
Total	40.5	9.5	33.8	16.1	0.1	46.5	35.0	3.0	12.0

Table 2 – Overall Satisfaction of Quality of the Melbourne Train Service

		Mean	Median
	All	5.28	6.00
Gender	M	5.29	6.00
	F	5.26	6.00
Age	16-24	5.43	6.00
	25-34	5.10	5.00
	35-44	5.09	5.00
	45-54	5.08	5.00
	55+	5.52	6.00
Frequency of travel	2 days or more per week	5.06	5.00
	1day per week	5.45	6.00
	1 to 3 days per month	5.44	6.00
	1day per year	5.37	6.00
	Less than 1 day per year	5.03	5.00
Time of travel	Weekday - Peak	5.08	5.00
	Weekday - Off-Peak	5.48	6.00
	Night	5.34	6.00
	Weekend	5.49	6.00
Year	1998	5.36	6.00
	1999	5.31	6.00
	2000	5.38	6.00
	2001	5.39	6.00
	2002	5.42	6.00
	2003	5.44	6.00
	2004	5.14	5.00
	2005	5.07	5.00
	2006	4.99	5.00

Table 3: Mean and median scores for survey responses

Table 3 provides mean and median responses of the survey. For the survey, 7=Totally satisfied, 6=Very satisfied, 5= Somewhat satisfied, 4=Don't know, 3=Somewhat dissatisfied, 2=Very dissatisfied, and 1=Totally dissatisfied.

Variables	Mean or Median	Gender			Age group					Frequency of train travel					Time travelled			
		All	M	F	16-24	25-34	35-44	45-54	55+	2days/week	1day/week	1-3 days/M	Once/year	<Once/year	WDP	WDOP	Nights	Weekends
Staff appearance	Mean	5.31	5.33	5.29	5.49	5.28	5.25	5.22	5.30	5.39	5.34	5.27	5.19	4.55	5.35	5.27	5.31	5.31
	Median	6.00	6.00	6.00	6.00	6.00	6.00	5.00	6.00	6.00	6.00	6.00	5.00	5.00	6.00	6.00	6.00	6.00
Operation hours	Mean	5.26	5.24	5.27	5.14	5.12	5.21	5.21	5.51	5.25	5.36	5.29	5.18	4.84	5.25	5.37	4.82	5.17
	Median	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.00	5.00	6.00	6.00	5.00	6.00
Heating in winter	Mean	5.26	5.30	5.23	5.28	5.14	5.17	5.18	5.44	5.19	5.39	5.35	5.18	4.97	5.16	5.36	5.32	5.32
	Median	6.00	6.00	6.00	6.00	5.00	5.00	5.00	6.00	5.00	6.00	6.00	5.00	5.00	5.00	6.00	6.00	6.00
Timetable Information	Mean	5.24	5.29	5.20	5.43	5.22	5.03	5.08	5.35	5.31	5.32	5.20	5.09	4.63	5.25	5.26	5.16	5.22
	Median	6.00	6.00	6.00	6.0	6.00	5.00	5.00	6.00	6.00	6.00	6.00	5.00	5.00	6.00	6.00	6.00	6.00
Number of announcements	Mean	5.14	5.14	5.14	5.37	5.03	4.99	5.01	5.24	5.07	5.28	5.23	5.08	4.37	5.07	5.21	5.12	5.25
	Median	5.00	5.00	5.00	6.00	5.00	5.00	5.00	6.00	5.00	6.00	6.00	5.00	4.50	5.00	6.00	5.00	6.00
Train on time	Mean	5.11	5.12	5.10	5.08	4.85	4.98	5.01	5.46	4.76	5.32	5.36	5.33	5.24	4.81	5.40	5.29	5.42
	Median	6.00	6.00	6.00	6.00	5.00	5.00	5.00	6.00	5.00	6.00	6.00	6.00	5.00	5.00	6.00	6.00	6.00
Station cleanliness	Mean	5.10	5.15	5.06	4.97	5.09	5.07	5.06	5.26	5.04	5.12	5.14	5.14	5.21	5.06	5.15	5.15	5.10
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00
Staff courteousness	Mean	5.10	5.13	5.07	5.05	4.96	5.02	5.07	5.30	5.10	5.19	5.11	5.02	4.55	5.08	5.16	4.98	5.06
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Lighting	Mean	5.05	5.27	4.89	5.19	5.03	4.97	5.02	5.04	5.18	5.10	4.99	4.81	4.53	5.11	4.95	5.24	5.10
	Median	5.00	6.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	6.00	5.00
Seat comfort	Mean	5.02	5.03	5.01	5.02	4.95	4.95	4.92	5.18	4.93	5.11	5.09	5.03	4.71	4.90	5.14	5.06	5.12
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Staff helpfulness	Mean	5.02	5.06	4.99	5.04	4.92	4.93	4.96	5.17	5.05	5.09	5.01	4.92	4.32	5.02	5.05	4.90	4.99
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Frequency peak time	Mean	5.01	5.11	4.94	5.31	4.94	4.82	4.89	5.04	4.94	5.22	5.06	4.95	4.74	4.96	5.03	5.24	5.05
	Median	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00	4.50	5.00	5.00	6.00	5.00

Frequency day time off peak	Mean	4.99	4.97	5.01	5.07	4.76	4.76	4.76	5.39	4.83	5.22	5.12	5.03	4.89	4.75	5.33	4.95	4.99
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	6.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00
Ticket range	Mean	4.96	4.96	4.96	5.12	4.79	4.68	4.75	5.26	5.02	5.09	4.95	4.76	4.82	4.95	5.04	4.77	4.86
	Median	5.00	5.00	5.00	6.00	5.00	5.00	5.00	6.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Amount of space	Mean	4.94	4.97	4.92	4.83	4.63	4.72	4.79	5.46	4.47	5.21	5.27	5.26	5.34	4.40	5.50	5.27	5.33
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	6.00	6.00	6.00	6.00	5.00	6.00	6.00	6.00
Graffiti at stations	Mean	4.89	4.94	4.85	4.91	4.99	4.90	4.82	4.87	4.99	4.91	4.84	4.72	4.50	4.94	4.84	4.96	4.84
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Value for money	Mean	4.85	4.90	4.82	4.62	4.46	4.59	4.62	5.60	4.64	5.15	5.03	4.86	4.82	4.60	5.20	4.82	4.88
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	6.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00
Clarity of announcement	Mean	4.84	4.92	4.79	5.10	4.82	4.76	4.65	4.86	4.83	4.96	4.87	4.75	4.11	4.81	4.85	4.91	4.97
	Median	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	5.00	5.00
Maintenance of facilities	Mean	4.81	4.88	4.75	4.89	4.77	4.72	4.69	4.90	4.77	4.84	4.84	4.81	4.55	4.77	4.82	4.92	4.92
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Cooling in summer	Mean	4.74	4.81	4.69	4.87	4.48	4.53	4.61	5.04	4.55	4.98	4.90	4.78	4.50	4.52	4.96	4.97	4.92
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Ticket access	Mean	4.71	4.75	4.68	5.07	4.57	4.37	4.34	4.98	4.82	4.88	4.66	4.41	4.18	4.71	4.75	4.65	4.63
	Median	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Number of cancellations	Mean	4.65	4.74	4.59	5.00	4.52	4.48	4.43	4.75	4.47	4.94	4.83	4.59	4.39	4.47	4.79	5.00	4.92
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	4.00	5.00	5.00	5.00	5.00
Facility range	Mean	4.58	4.64	4.54	4.87	4.55	4.40	4.37	4.65	4.54	4.63	4.61	4.61	4.68	4.56	4.58	4.63	4.72
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Connecting services information	Mean	4.56	4.55	4.56	4.88	4.55	4.31	4.31	4.65	4.60	4.69	4.53	4.45	4.26	4.54	4.57	4.55	4.65
	Median	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	5.00	5.00	4.00	4.00	5.00	5.00	5.00	5.00
Graffiti on trains	Mean	4.38	4.52	4.28	4.51	4.55	4.41	4.29	4.26	4.50	4.37	4.35	4.17	3.89	4.46	4.29	4.49	4.36
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	5.00	5.00
Ticket price	Mean	4.38	4.43	4.34	3.98	3.91	4.11	4.17	5.26	4.15	4.67	4.56	4.39	4.39	4.10	4.79	4.24	4.33
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Frequency weekends	Mean	4.35	4.42	4.29	4.40	4.28	4.31	4.26	4.44	4.26	4.41	4.43	4.35	4.37	4.24	4.35	4.29	4.81
	Median	4.00	4.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00
Train cleanliness	Mean	4.33	4.54	4.18	4.37	4.30	4.30	4.23	4.43	4.26	4.39	4.39	4.36	3.95	4.27	4.37	4.29	4.44
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	5.00	5.00

Comfort when not seated	Mean	4.23	4.48	4.05	4.23	4.12	4.17	4.16	4.36	4.03	4.37	4.41	4.29	4.21	4.02	4.41	4.42	4.51
	Median	5.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.50	5.00	5.00	5.00
Frequency nights	Mean	4.20	4.27	4.14	4.30	4.21	4.16	4.12	4.19	4.17	4.24	4.23	4.17	4.00	4.17	4.18	4.35	4.33
	Median	4.00	4.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	4.00
Cancellation information	Mean	4.18	4.22	4.15	4.47	4.10	4.00	3.92	4.32	3.98	4.34	4.33	4.28	4.11	4.01	4.33	4.40	4.39
	Median	4.00	5.00	4.00	5.00	5.00	4.00	4.00	4.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00
visibility other times	Mean	4.16	4.30	4.06	4.64	4.21	3.99	3.91	4.05	4.27	4.22	4.08	4.01	3.92	4.23	4.05	4.31	4.23
	Median	5.00	5.00	4.00	5.00	5.00	4.00	4.00	4.00	5.00	5.00	4.00	4.00	4.00	5.00	4.00	5.00	5.00
Platform surveillance	Mean	4.13	4.37	3.96	4.51	4.14	3.92	3.93	4.13	4.22	4.30	4.09	3.92	4.00	4.15	4.10	4.17	4.20
	Median	4.00	5.00	4.00	5.00	4.00	4.00	4.00	4.00	5.00	5.00	4.00	4.00	4.00	5.00	4.00	5.00	4.00
Ticket vending machines	Mean	3.98	4.04	3.94	4.47	3.92	3.66	3.59	4.12	4.04	4.20	3.98	3.71	3.45	3.97	4.00	4.06	4.03
	Median	4.00	5.00	4.00	5.00	5.00	4.00	3.00	4.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00
Visibility around station	Mean	3.91	4.03	3.83	4.32	3.98	3.72	3.69	3.85	4.12	3.93	3.77	3.69	3.45	4.06	3.77	3.89	3.87
	Median	4.00	5.00	4.00	5.00	4.50	3.00	3.00	4.00	5.00	4.00	3.00	3.00	3.00	5.00	4.00	4.00	4.00
Train safety after dark	Mean	3.67	3.89	3.51	3.93	3.66	3.54	3.51	3.68	3.75	3.79	3.63	3.47	3.53	3.68	3.64	3.74	3.73
	Median	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00
Station safety after dark	Mean	3.67	3.91	3.51	3.82	3.65	3.58	3.58	3.72	3.74	3.80	3.63	3.53	3.53	3.67	3.65	3.79	3.72
	Median	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Car park surveillance	Mean	3.58	3.72	3.47	3.67	3.50	3.47	3.45	3.70	3.59	3.72	3.57	3.48	3.34	3.51	3.63	3.68	3.67
	Median	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Police availability	Mean	3.57	3.63	3.53	3.88	3.46	3.41	3.40	3.63	3.57	3.70	3.56	3.51	3.55	3.53	3.61	3.59	3.64
	Median	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Loutish behaviour	Mean	3.56	3.65	3.49	3.93	3.52	3.42	3.34	3.54	3.56	3.68	3.57	3.46	3.32	3.53	3.54	3.62	3.72
	Median	3.00	3.00	3.00	4.00	3.00	3.00	3.00	4.00	3.00	4.00	4.00	4.00	3.00	3.00	4.00	3.00	4.00
Visibility after dark	Mean	3.53	3.59	3.49	3.75	3.37	3.38	3.39	3.66	3.53	3.61	3.52	3.53	3.53	3.50	3.61	3.42	3.49
	Median	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00

Table 4: Mean scores for survey responses across years

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
Staff appearance	5.39	5.26	5.25	5.37	5.27	5.34	5.26	5.33	5.32
Operation hours	5.27	5.26	5.28	5.28	5.32	5.39	5.24	5.25	5.07
Heating in winter	5.32	5.20	5.22	5.21	5.27	5.30	5.22	5.29	5.31
Timetable information	5.22	5.17	5.21	5.13	5.26	5.33	5.23	5.32	5.26
Number of announcements	5.05	5.02	5.13	5.11	5.20	5.34	5.16	5.14	5.10
Train on time	5.10	5.12	5.28	5.31	5.37	5.45	4.92	4.78	4.68
Station cleanliness	5.34	5.28	5.15	4.98	5.12	5.04	4.97	5.02	5.02
Staff courteousness	5.10	5.01	5.04	5.11	5.05	5.15	5.12	5.14	5.16
Lighting	5.14	5.04	5.08	5.03	5.06	5.07	4.98	5.05	4.98
Seat comfort	5.12	4.95	4.91	4.89	5.02	5.04	5.03	5.16	5.07
Staff helpfulness	5.02	4.92	4.94	5.03	4.95	5.09	5.05	5.09	5.08
Frequency peak time	5.11	5.09	5.13	5.11	5.17	5.18	4.89	4.85	4.60
Frequency day time off peak	5.04	5.00	5.02	5.04	5.04	5.10	4.95	4.95	4.80
Ticket range	4.96	4.89	4.96	4.91	4.98	5.06	4.92	5.02	4.94
Amount of space	5.05	5.08	5.01	4.98	5.03	5.06	4.83	4.80	4.66
Graffiti at stations	5.17	5.02	4.90	4.78	4.83	4.82	4.79	4.91	4.84
Value for money	4.97	4.92	4.99	4.84	4.96	4.96	4.63	4.73	4.70
Clarity of announcement	4.58	4.64	4.68	4.81	5.00	5.05	4.95	4.94	4.89
Maintenance of facilities	5.00	4.85	4.80	4.67	4.77	4.86	4.74	4.82	4.78
Cooling in summer	4.78	4.64	4.61	4.53	4.77	4.75	4.68	4.94	4.99
Ticket access	4.56	4.45	4.64	4.46	4.47	4.81	4.98	5.03	4.92
Number of cancellations	4.79	4.78	4.77	4.90	4.89	4.91	4.36	4.26	4.26
Facility range	4.71	4.62	4.54	4.53	4.57	4.64	4.50	4.59	4.55
Connecting services information	4.50	4.53	4.55	4.53	4.58	4.64	4.56	4.61	4.53
Graffiti on trains	4.38	4.24	4.18	4.25	4.26	4.35	4.48	4.74	4.57
Ticket price	4.63	4.46	4.49	4.30	4.43	4.46	4.13	4.27	4.27
Frequency weekends	4.12	4.17	4.35	4.37	4.46	4.49	4.38	4.44	4.30
Train cleanliness	4.30	4.16	4.04	4.17	4.32	4.43	4.39	4.60	4.55
Comfort when not seated	4.27	4.25	4.19	4.20	4.32	4.33	4.24	4.21	4.09
Frequency nights	4.17	4.14	4.18	4.26	4.29	4.28	4.15	4.18	4.11
Cancellation information	4.16	4.13	4.14	4.25	4.36	4.34	4.12	4.10	4.04
Visibility other times	4.10	4.05	4.12	4.08	4.14	4.23	4.21	4.26	4.24
Platform surveillance	4.24	4.11	4.08	4.03	4.14	4.12	4.10	4.21	4.19
Ticket vending machines	3.84	3.74	3.94	3.59	3.53	4.04	4.32	4.40	4.39
Visibility around station	3.78	3.70	3.82	3.80	3.88	3.97	4.02	4.16	4.08
Train safety after dark	3.65	3.51	3.55	3.62	3.74	3.70	3.71	3.78	3.76
Station safety after dark	3.72	3.59	3.62	3.60	3.68	3.68	3.67	3.76	3.75
Car park surveillance	3.56	3.57	3.52	3.47	3.57	3.63	3.60	3.65	3.61
Police availability	3.51	3.41	3.45	3.52	3.60	3.66	3.62	3.68	3.68
Loutish behaviour	3.60	3.41	3.43	3.52	3.66	3.64	3.56	3.64	3.55
Visibility after dark	3.40	3.38	3.38	3.56	3.58	3.61	3.64	3.64	3.57

Table 5: Factor Analysis Results

Factor Analysis Rotated Component Matrix

	Component						
	F1	F2	F3	F4	F5	F6	F7
	Safety	Comforts	Service Delivery	Facilities	Staff	Information	Ticketing
Train safety after dark	0.755						
Station safety after dark	0.715						
Police availability	0.667						
Loutish behaviour	0.650						
Visibility after dark	0.621						
Car park surveillance	0.614						
Platform surveillance	0.608						
Seat comfort		0.595					
Cooling in summer		0.577					
Amount of space		0.569					
Train cleanliness		0.563					
Comfort when not seated		0.554					
Heating in winter		0.551					
Graffiti on trains		0.468					
Frequency nights			0.655				
Frequency day time off peak			0.631				
Frequency weekends			0.627				
Operation hours			0.601				
Frequency peak time			0.518				
Train on time			0.466				
Number of cancellations			0.431				
Station cleanliness				0.724			
Graffiti at station				0.705			
Maintenance of facilities				0.682			
Facility range				0.547			
Lighting				0.506			
Staff helpfulness					0.816		
Staff courteousness					0.812		
Staff appearance					0.762		
Visibility around station					0.538		
Visibility other times					0.482		
Number of announcements						0.641	
Clarity of announcement						0.622	
Connecting service information						0.559	
Cancellation information						0.512	
Timetable information						0.511	
Ticket price							0.681
Ticket range							0.635
Ticket access							0.618
Value for money							0.614
Ticket vending machines							0.584
%Variance explained	24.99	6.45	4.70	4.19	3.64	3.44	3.21
Reliability coefficient - Alpha	0.845	0.759	0.762	0.780	0.818	0.710	0.754
Anova statistics - Gender	439.52***	73.56***	9.57**	80.43***	0.77(ns)	8.16**	21.29***
Kruskal-Wallis statistics - Gender	436.86***	74.27***	13.98***	76.79***	3.13(ns)	8.58**	20.26***
Anova statistics - – Age	143.36***	187.68***	101.31***	37.80***	7.17***	352.48***	532.83***
Kruskal-Wallis statistics - Age	513.72***	752.65***	355.74***	171.50***	27.01***	1346.62***	2172.61**
Anova statistics - Travel Frequency	42.86***	284.78***	121.83***	56.97***	20.24***	22.82***	24.86***
Kruskal-Wallis statistics –Travel freq	168.02***	1018.37***	447.67***	298.45***	105.45***	117.00***	109.37***
Anova statistics - Time travelled	14.86***	368.09***	158.77***	76.22***	16.67***	30.74***	97.03***
Kruskal-Wallis statistics -Travel time	67.48***	1323.54***	601.23***	342.41***	87>85***	126.92***	452.36***

Table 6 Regression Analysis

Model 1	
Variable	Coefficient
Constant	5.28 ^{***}
Safety	0.18 ^{***}
Comforts	0.43 ^{***}
Service Delivery	0.55 ^{***}
Facilities	0.13 ^{***}
Staff Impact	0.10 ^{***}
Information	0.28 ^{***}
Ticketing	0.27 ^{***}
Adj R ²	0.37
P-value	0.00

*** Significantly different from zero at the 1% level: ** significantly different at the 5% level