Customers' Perceptions of Metropolitan Train Services in Melbourne

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1   Introduction

Public transport is an important element in solving the problems of greenhouse gas emissions and traffic congestion. The public transport industry is focussed on providing and improving public transport services in Melbourne in order to increase passenger numbers and address these and other problems. This study examines the public's perceptions of train service in Melbourne to contribute to developing solutions to improve public transport services.

Koushki et al. (2003) examine management awareness of passenger priorities, as well as passenger satisfaction with the current performance of transport services in Kuwait. They indicate that transport managers' perceptions of passengers needs do not accurately reflect actual passenger needs. Further, they argue that lack of compatibility between passenger needs and managements' perception of those needs could result in the misallocation of scarce resources as well as growing passenger dissatisfaction with transit services. 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), Cavana, Corbett and Lo (2007)). Hanna and Drea (1998) examine commuter preferences when choosing between Amtrak train services and automobile services to travel between cities. They find that automobile comfort and no information on scheduling (time table) adversely affect commuters' likelihood to choose Amtrak train services. Conversely, factors which improve the likelihood commuters will choose Amtrak train services include the: 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. Douglas Economics (2006) examines passenger attitudes towards NSW train and service quality. The study covers many aspects of rail service including (i) service factors such as service delivery, reliability and safety aspects; (ii) train facilities and comforts and (iii) station attributes such as information and ticketing. They estimate that males tended to rate train and station personal security higher than females but otherwise there was little difference in the male and female overall rail service ratings.. Older respondents (aged 60+) tended to rate lower than either 20-59 year olds or under 20 year olds. Regular users also tended to rate lower than occasional users. Passenger making off peak medium distance trips tended rate higher than peak medium distance trips. Further, the study finds that there was a tendency for improvement priority to be inversely related to ratings: Attributes rated highly tended to have a low improvement priority whereas poorly rated attributes had a high priority. Similar details are not readily available on passengers' perceptions of the quality of transport services in Victoria. 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 with services.

Public transport customer satisfaction surveys have been conducted on a monthly basis in Melbourne since July 1997. A rich source of data is available in the Customer satisfaction database. The primary and secondary contributors to satisfaction are identified in the quarterly and annual Customer Satisfaction Monitor reports. The potential exists for valuable information to be gained by further examining which factors have a significant impact on customer satisfaction. By analysing this information it may be possible to provide public

transport providers and operators with additional information on what factors they should focus on in order to improve overall customer satisfaction. Therefore the primary objective of this paper is to make use of the rich sources of data available in the customer satisfaction data and investigate the customers' perceptions of metropolitan train services in Melbourne and identify some pressing customer needs. The data from the customer satisfaction survey of metropolitan train services were analysed using univariate, factor and regression analyses.

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   Methodology

The Public Transport Division of the Department of Infrastructure commissions ongoing surveys of customer satisfaction with public transport services. Quarterly data are collated from independent samples of users of trams, metropolitan buses, metropolitan trains, metropolitan taxis, v/line trains and v/line coaches. Information is also collected from 'non users' of public transport. The methodology adopted is telephone interviewing, which is conducted monthly. The sample is randomly selected from electronic telephone directories in areas where services operate. No respondent answers questions relating to more than one mode. The present study is limited to Metropolitan train services, and includes only the respondents who used the train service at least once a year prior to the survey and covers the nine years, from January 1998 to December 2006. The sample size for metropolitan train services is around 3400 passengers each year spread evenly over four quarters. The respondents are asked various questions about metropolitan train services including customer satisfaction ratings on overall satisfaction with the services, overall value for money, information, service delivery, comforts, staff, safety, station and ticketing. The respondents were asked to indicate whether they were satisfied or dissatisfied using a six point scale as follows: totally satisfied, very satisfied, somewhat satisfied, somewhat dissatisfied, very dissatisfied and totally dissatisfied. Respondents uncertain about their satisfaction responded 'don't know'.

For our analysis, scores were assigned to responses according to the seven point **Likert Scale** and they are: Totally satisfied – 7, Very Satisfied – 6, Somewhat satisfied – 5, Don't know – 4, Somewhat dissatisfied – 3, Very dissatisfied 2 and Totally dissatisfied 1.

Analysis of respondent demographics shows that male respondents comprised 41.8% of the survey (n=12893) while female respondents comprised 58.2% (n=17941). The percentage of female respondents is higher and very consistent throughout the years. Out of train users, 20.7 % of the respondents use only train and the balance uses both train and tram. The percentages remain similar from year to year. The age group composition (%) of total respondents is: 16 to 24yrs – 20.5, 25 to 34 yrs – 17.3, 35 to 44 yrs – 17.9, 45 to 54 yrs - 16.9 and 55 yrs and over – 27.3%. A slight decline in 16 to 24 yrs group is noticed from year 2004 onwards, which has resulted in a slight increase in the 55 yrs and above category. The frequency of train use (%) profile is as follows: 2 or more days per week - 40.5, one day per week - 9.5, one to 3 days per month – 33.8 and one or less day per year - 16.2. The general period of travel of 46.5% respondents is weekday at peak time, 35% weekday off peak time, 12% weekends and 3% night travellers. The remaining 3.5 % of the respondents could not remember and did not report. The total number of respondents for the period from January 1998 to December 2006 is 30834. The number of responses for each year from 1998 to

2006, along with the percentage of gender, type of service user, age group and frequency of train user mix are given below in **table 1.**

Table 1: Respondent characteristics, Gender, type of service user, age group, frequency of train use and time travelled

Year	Respon-dents (N)	Gender (%)		Type of service user (%)		Age group (%)				
		M	F	Train	Train Tram	16-24	25-34	35-44	45 -54	55+
1998	2834	41.7	58.3	20.0	80.0	24.9	17.9	18.8	14.3	24.1
1999	3471	40.4	59.6	21.0	79.0	23.7	17.0	18.0	15.4	25.8
2000	3534	42.0	58.0	20.5	79.5	21.6	17.0	19.3	16.2	25.9
2001	3476	42.2	57.8	20.9	79.1	21.3	18.8	18.1	16.8	25.0
2002	3487	42.8	57.2	20.6	79.4	21.0	18.3	18.9	16.5	25.3
2003	3476	42.0	58.0	20.6	79.4	21.0	17.4	17.0	17.7	26.8
2004	3545	41.2	58.8	20.8	79.2	17.6	17.9	17.5	17.5	29.5
2005	3534	42.6	57.4	19.7	80.3	18.8	17.1	16.3	18.3	29.5
2006	3477	41.5	58.5	21.7	78.3	15.7	14.6	17.7	18.7	33.3
Total	**30834**	**41.8**	**58.2**	**20.7**	**79.3**	**20.5**	**17.3**	**17.9**	**16.9**	**27.3**

Year	Respon-dents (N)	Frequency of train use (%)					Time travelled (%)			
		>2d /w	1d /w	1-3d /m	1d /year	<1d /year	wdp	wdop	night	we
1998	2834	39.0	10.6	34.5	15.2	0.7	45.2	36.2	2.6	13.9
1999	3471	39.0	10.5	33.9	16.2	0.5	44.7	37.7	3.2	12.0
2000	3534	40.0	9.9	33.0	17.1	0.0	46.6	35.9	3.0	11.8
2001	3476	39.8	10.0	33.3	16.8	0.0	44.0	34.9	3.3	13.6
2002	3487	41.1	8.7	33.8	16.3	0.0	47.8	32.3	3.2	12.4
2003	3476	40.4	9.3	33.7	16.6	0.0	46.4	33.8	3.5	12.2
2004	3545	42.2	8.5	34.4	14.9	0.0	49.0	35.2	2.7	9.4
2005	3534	42.7	8.0	34.9	14.5	0.0	48.2	34.1	2.5	10.9
2006	3477	39.7	10.3	32.7	17.3	0.0	45.5	35.3	2.7	12.7
Total	**30834**	**40.5**	**9.5**	**33.8**	**16.1**	**0.1**	**46.5**	**35.0**	**3.0**	**12.0**

3   Results and Discussion

The Results are presented in three sections. Firstly basic univariate analysis uses mean and median satisfaction scores to identify the level of customer satisfaction with each service attribute. Secondly, factor analysis is used to uncover the latent structure (dimensions) of a set of variables: it condenses the large number of customer satisfaction attributes into a smaller set of factors. This helps in understanding which attributes, of the great many that are measured, impact on customers' overall perceptions of service. Thirdly, regression analysis is used to order the factors identified by the factor analysis, as the independent variables, in terms of their affect on overall satisfaction. This allows the prioritization of actions to improve overall customer satisfaction.

3.1   Univariate Analysis

Table 2 provides mean and median ratings of responses for each question in the survey split by gender, age group, frequency of train travel and the period of time travelled. In general, overall median responses of 6 (very satisfied) or above were achieved for **"timetable information"**, **"train on time"**, **"operation hours"**, **"heating in winter"** and **"staff appearance"**, reflecting high levels of satisfaction. However, as regards to timetable information the 45-54 age group and casual travellers gave a median score of 5 (somewhat satisfied). In the case of operation hours only the casual travellers gave a median score of 5. For heating in winter the 25 to 54 age group, frequent travellers of more than 2 days per week, casual travellers and weekday peak hour travellers gave a median score of 5. The 35

to 54 age group and casual travellers have given a median score of 5 for timetable information. The 25 to 54 age group, casual traveller using the train less than once a year and weekday peak hour travellers are concerned about train on time and gave a score of 5. Lower scores for casual travellers are expected. However, the median scores for all other aspects of service were below 6, indicating passengers are somewhat satisfied or not satisfied.

In terms of average responses, Table 4 shows that the questions related to **"timetable information"**, **"number of announcements"**, **"train on time"**, **"frequency peak time"**, **"operation hours"**, **"seat comfort"**, **"heating in winter"**, **"lighting"**, **"station cleanliness"**, **"staff courteousness"**, **"staff helpfulness"** and **"staff appearance"** received average scores between 5 and 5.5. This shows that on average passengers are reasonably satisfied with these aspects of service. As regards to timetable information all mix of gender, age group, frequency of train travel and period of time travel are reasonably satisfied except for non frequent travellers with a score of 4.63. Similarly, for number of announcements, immaterial to gender, age group, frequency of train travel and period of time travelled, respondents are generally satisfied. However, the exceptions are the 35-44 age group with a score of 4.99 and non frequent travellers with a score of 4.37. People aged 25-44 and regular travellers are less satisfied than others in the group regarding train on time. In the case of frequency of services in the peak time, females, the 25-54 age group and casual travellers gave a lower score. As seen in the table 4, among the other aspects some of the responses are not consistent and are less than 5 within the groups of gender, age group, frequency of travel and period of time travelled.

Overall, 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 average scores of less than 4 and this result is consistent across the groups. This indicates passengers are dissatisfied with safety related issues. Other variables related to cleanliness, **"train cleanliness"** and **"graffiti on trains"**, received average scores of less than 4.5, indicating dissatisfaction with cleanliness. Generally, it is also seen from table 2, 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. For all other aspects there is no marked difference in the ratings between males and females.

Ratings also differ by age group. For most of the highly rated attributes such as heating in winter, timetable information, number of announcements, station cleanliness, staff courteousness, seat comfort, staff helpfulness etc, the younger age group (16-24 years) and people over 55 years tended to give higher ratings than others. The casual travellers who use the train once a year or less tended to give lower ratings than others for most of the attributes. The ratings of people who travel at different times are fairly similar for most of the attributes. However, there are some important attributes where the ratings differ. 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 nights and for cancellation information.

Table 2: Mean and median scores for survey responses

Table 2 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	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

Attribute																		
time off peak	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	4.50	5.00	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
Overall satisfaction	**Mean**	**5.28**	**5.29**	**5.26**	**5.43**	**5.10**	**5.09**	**5.08**	**5.52**	**5.06**	**5.45**	**5.44**	**5.37**	**5.03**	**5.08**	**5.48**	**5.34**	**5.49**
	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**

The mean (5.28) and median (6.00) of overall customer satisfaction, which is rated separately from satisfaction with the various service attributes by the respondents, are also given at the bottom of the table 4. No significant difference is observed between male (mean=5.29, median=6.00) and female (mean=5.26, median=6.00) ratings. However, there are differences in ratings amongst the other age groups. 16 - 24 years old (mean=5.43, median=6.00) and 55 years and over (mean=5.52, median=6.00) rated higher than the other three investigated age groups: 25 – 34 yrs (mean=5.10, median=5.00), 35 – 44 yrs (mean=5.09, median=5.00) and 45 – 54 yrs (mean=5.08, median=5.00). There is no difference amongst them. The frequent traveller who uses the train more than 2 days per week (mean=5.06, median=5.00) and the passenger who uses the train less than once a year (mean=5.03, median=5.00) tended towards lower rating than the others. There is no difference between one day a week (mean=5.45, median=6.00), 1-3 days a month (mean=5.44, median=6.00) or once a year users (mean=5.37, median=6.00) of trains, who tended to rate higher. The weekday peak time travellers (mean=5.06, median=5.00) rated overall satisfaction lower than weekday off peak (mean=5.48, median=6.00), nights (mean=5.34, median=6.00) and weekend (5.49, median=6.00) travellers.

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

Initially factor analysis[1] was carried out on all customer satisfaction ratings. From the component matrix, as a standard practice, attributes with values less than a component value of 0.4 were discarded as this implies that the customers considered them to be less important. The perceptions that were discarded for the factor analysis were **"travel time in relation to distance"**, **"time allowed to get in and out"**, **"commuter car parking"**, **"bus interchange facilities"**, **"frequency of ticket checked"** and **"manner of ticketing staff"**. To investigate the justification of the omission, a regression analysis was conducted with the overall satisfaction score as the independent variable and the factors with the discarded attributes. It will be discussed later in the regression analysis. The factor analysis was carried out with the remaining 41 attributes. From these attributes, initially 9 factors were selected using Kaiser Criterion (dropped all components with Eigen values under 1.0). Various factor analysis models, varying from 6 to 9 factors were tried and it was finally decided to use a best fitted seven–factor model which generated the most comprehensible factor structure. This structure is consistent with the major groups identified in the questionnaire except for some minor changes.

The results are reported in **Table 3** along with the reliability coefficient alpha, percentage variance explained, analysis of variance (Anova) and Kruskal-Wallis Chi-square test statistics for gender, age group, travel frequency and time travelled. When the reliability coefficients - alpha was greater than 0.7, the factor groups in relation to the customer perceptions are reliable and could be accepted. Table 3 also shows 50.32% of the variation in survey responses is explained by this factor analysis, indicating the analysis yielded useful results. The seven factors are summarised and named as follows:
- Factor one focussed on safety related perceptions. This factor is labelled as "safety aspects" and explained 24.99% of the variance.
- The second factor placed a heavy emphasis on perceptions related to comfort. This was named "comfort aspects". This factor explained 6.45% of the variance.

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[1] Factor analysis is a statistical technique which uses the correlations between observed variables to estimate common factors and the structural relationships linking factors to observed variables.

- The third factor had high loadings in the variables related to frequency of services. This factor is labelled "service delivery aspects" and explained 4.70% of the variance.
- The forth factor had high loadings in perceptions related to facilities. This factor is labelled "facilities aspects" and explained 4.19% of the variance.
- The fifth factor had high loadings in perceptions related to staff. This factor is labelled "staff impact". This factor explained 3.64% of the variance.
- The sixth factor had high loadings in perceptions related to information. This factor is labelled "Information aspects". This factor explained 3.44% of the variance.
- The seventh factor had high loadings in perceptions related to ticketing. This factor is labelled "ticketing aspects" and explained 3.21% of the variance.

The factor analysis condensed the number of investigated attributes (41) into a smaller set of factors (7). This analysis helps us to understand which factors impact the most on customers' overall perception of service. Based on results in table 3, attributes with a component value of 0.6 or more are the most important factors in the survey. Of attributes with values of 0.6 or more, which impact customers' perceptions the most, we find several of these attributes achieved low average satisfaction scores (see section 3.1). The following factors impact customer perceptions the most, but achieved low average satisfaction scores: **"visibility around station"**, **"visibility after dark"**, **"loutish behaviour"**, **"police availability"**, **"train safety after dark"**, **"station safety after dark"**, **"ticket vending machines"** and **"car park surveillance"**. Overall, factor analysis also shows the most important factor of concern to customers is the perceptions about safety aspects. While safety aspects are the most important factor to customers, it is the safety aspect which achieves low customer satisfaction scores, with averages less than 4 (see section 3.1).

ANOVA and Krukal-Wallis Chi-square test statistics for Gender, age group, travel frequency and travel time are highly significant statistically, which indicates that the aspects of safety, comforts, service delivery, facilities, staff, information and ticketing perceptions varies within the gender, age group, travel frequency and travel time. In the following sections we discus them one by one:

3.2.1 Gender:

Females consistently tended towards lower ratings than males for all the seven safety aspects. But in the median ratings, males gave a higher rating only for platform surveillance. There is no difference between male and female ratings for seat comfort, amount of space and heating in winter. But, in all the other four comfort aspects, males gave significantly higher ratings than females. In the median ratings for the comfort when not seated females gave a lower rating than males. Females gave significantly lower ratings than males for frequency weekends, frequency peak time and number of cancellation in the service delivery aspects. There is no gender difference in the ratings of the other service delivery aspects and there is also no difference in the median ratings between males and females. As regards to aspects of facilities there is no difference between males and females except for lighting where females are highly concerned, giving a lower mean and median than males. Females are more concerned with staffing aspects, visibility around station and visibility of staff at other times, giving a lower mean and median than males. For other staffing aspects there is no difference between females and males. Males and females have similar views regarding information aspects except for clarity of announcements, where females gave a lower rating. The only aspects females differ from males in ticketing aspects is ticket vending machines and, giving a lower mean and median rating than males.

Table 3: Factor Analysis Results

Factor Analysis Rotated Component Matrix							
	Component						
	F1	F2	F3	F4	F5	F6	F7
	Safety aspects	Comforts aspects	Service Delivery	Facilities aspects	Staff Impact	Information aspects	Ticketing aspects
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 – Gender (F sig level)	439.52***	73.56***	9.57**	80.43***	0.77(ns)	8.16**	21.29***
Kruskal-Wallis(Chi-square) - Gender	436.86***	74.27***	13.98***	76.79***	3.13(ns)	8.58**	20.26***
Anova – Age Group (F sig level)	143.36***	187.68***	101.31***	37.80***	7.17***	352.48***	532.83***
Kruskal-Wallis(Chi-square) – Age Gr	513.72***	752.65***	355.74***	171.50***	27.01***	1346.62***	2172.61***
Anova – Travel Frequency(F sig level)	42.86***	284.78***	121.83***	56.97***	20.24***	22.82***	24.86***
Kruskal-Wallis(Chi-square)– Travel freq	168.02***	1018.37***	447.67***	298.45***	105.45***	117.00***	109.37***
Anova – Time travelled (F sig level)	14.86***	368.09***	158.77***	76.22***	16.67***	30.74***	97.03***
Kruskal-Wallis(Chi-square)- Travel time	67.48***	1323.54***	601.23***	342.41***	87>85***	126.92***	452.36***

3.2.2   Age Group:

The 16-24 year age group and the 55 years and over age group gave higher ratings for almost all of the five safety aspects than the 25-34, 35-44 and 45-54 year age groups. Median ratings are similar except for loutish behaviour, where the 25-54 year age groups gave a lower rating. A similar trend is observed regarding aspects of comforts except train cleanliness and graffiti in trains. There is no significant difference between the age groups for the ratings for train cleanliness except for graffiti on trains where the 44-54 year and 55 years and above groups gave a lower rating than the other age groups. The age groups 16-24 and 55+ years gave higher ratings for frequency day time off peak, frequency weekends, frequency peak time, train on time and number of cancellations than the other age groups as regards to service delivery aspects. For frequency at nights all the age groups gave a low rating than the younger 16-24 year group. But for operation hours, the 55 years and above group gave a higher rating. The 16-24 year and 55 years and above age groups have given higher ratings for maintenance of facilities and facility range than other age groups. For lighting facilities, the 16-24 year group gave a higher rating than the other age groups. The 55 years and above group gave a higher rating for station cleanliness than the other age groups. The 45 - 54 year group gave a lower rating for graffiti at station than the other age groups. For staffing aspects, the 55 years and above group gave higher ratings for staff helpfulness and staff courteousness than the other groups. In relation to visibility around station and visibility at other times both the 16-24 year and 55 years and above group gave higher ratings than the other age groups. For staff appearance, the 16-24 year group gave higher ratings than the other year groups. The 16 –24 year and 55 year age group tended to give higher ratings to number of announcement and cancellation information than the other age groups. The 16-24 year, 25-34 year and 55 and above year groups gave higher ratings to connecting service information and time table information than the other age groups. As regards to clarity of announcements, the 16-24 year group tended to give higher ratings and the 44-54 year group tended to give a lower rating than the other age groups. The 55 years and above group tended to give a higher rating than the 25-54 year group which in turn gave a higher rating than 16-24 year group regarding ticket price. The 16-24 year, 25-34 year and 55 years and above groups tended towards higher ratings than other age groups in relation to ticket access and ticket vending machines. The 25-34 year group tended towards the lowest and the 55 years and above group gave the highest rating than other age groups for value for money.

3.2.3   Frequency of time travelled:

Regular travellers, travelling more than one day per week tended to give higher ratings for train and station safety after dark and for platform surveillance than the occasional traveller who makes trips less than 1-3 days per month. As regards to police availability, loutish behaviour and car park surveillance, the one day per week traveller gave higher scores than the other regular and occasional travellers. There is no significant difference between the ratings of all travellers' for visibility after dark. For comforts aspects such as space and comfort when not seated, regular travellers of 2 or more days per week tended to give lower ratings than the other types of travellers. Occasional travellers travelling less than once a year gave lower ratings than all the other travellers for train cleanliness and heating in winter. As regards to graffiti in trains all types of travellers differ from each other. Frequency night was given a lower rating by occasional travellers who travel less than once a year than the other types of travellers. The travellers who at least travel more than 2 days per week and occasional traveller travelling less than once a year tended to give lower ratings than other travellers for frequency daytime off peak. As regards to frequency weekend and train on time, the frequent traveller (2 days per week) tended to give lower scores than all the other

travellers. Occasional travellers (once a year or less) gave a lower rating than the other groups for operation hours. One day a week and 1-3 days a month travellers gave a higher rating than other travellers for frequency peak time. For number of cancellation frequent travellers (at least 2 days per week) and occasional travellers (once a year or less) gave a lower rating than other travellers. As regards to facilities aspects,, station cleanliness and facility range frequent travellers (2days per week) tended to give lower ratings than other traveller types. For graffiti at station and maintenance of facilities occasional travellers gave lower ratings than other groups. For lighting, frequent travellers (more than 1 day per week) gave a higher rating than the occasional travellers. As regards to all the staffing aspects, frequent travellers tended to give higher ratings than occasional travellers. For the information aspects, occasional travellers (travelling in the train less than once a year) gave lower ratings than the other travellers for number of announcements, clarity of announcement, connecting service information and timetable information. However for cancellation information, regular travellers (2 days per week) gave a lower rating than other travellers. For ticketing aspects, including ticket range, ticket access and value for money, regular travellers (1-3 days a month) tended to give a higher rating than the occasional travellers. For ticket price and value for money frequent travellers (travelling more than 2 days per week) gave a lower rating for ticket price. The occasional traveller making a trip less than once a week gave higher ratings for seat comforts and cooling in summer than the other type of travellers.

3.2.4   Time travelled:

Considering the safety aspects, there is not much difference between the time travelled for police availability, visibility after dark and platform surveillance. Night and weekend travellers tended to give lower ratings than weekday peak and off peak travellers for train and station safety after dark. As regards to loutish behaviour, weekend travellers gave a higher rating than other travellers. Weekdays off peak, nights and weekend travellers gave a higher rating than weekday peak travellers for car park surveillance. For comfort aspects weekday peak time travellers tended to give lower ratings than the other travellers for all the comfort aspects except for graffiti on trains For graffiti on trains, week day off peak travellers and weekend travellers gave a lower rating than weekday peak travellers and night travellers. As regards to service delivery aspects the weekday peak time travellers gave a low rating for frequency day time off peak, train on time and number of cancellation than all the othertravellers .Weekend travellers gave a higher rating to frequency weekends than the others. Night travellers gave a low rating for operation hours and a higher rating for frequency peak time than the other travellers. Night and weekend travellers gave a higher rating for frequency night than the others. With regards to aspects of facilities, there is no significant difference between any traveller groups. Weekday peak and night travellers gave a higher rating for graffiti at station than other travellers. Weekend and night travellers gave a higher rating for maintenance of facilities than the others. When considering the staffing aspects, for staff appearance there is no difference between the ratings between traveller groups. The night travellers gave a low rating for staff helpfulness than the others. Weekday off peak travellers gave a higher rating for staff courteousness. For visibility around station, weekday peak time travellers gave a higher rating than the other groups. Weekday off peak travellers gave a low rating for visibility at other times than other travellers. For the information aspects, for number of announcements, weekday off peak time travellers and weekend travellers gave a higher rating than the other traveller groups. Weekend travellers gave a higher rating for clarity of announcement and for connecting service information than the other travellers. Weekday peak time travellers gave a lower rating for cancellation information. Weekday off peak travellers gave a lower rating for timetable information. For the ticketing aspect, for ticket vending machine there is no significant difference observed

between the different traveller groups. For ticket price and value for money, the weekday peak time traveller gave a lower rating than others. Night and weekend travellers gave a lower rating for ticket range than the other groups.   For facility range, night travellers gave a higher rating for lighting than the other daytime travellers.

3.3   Regression Analysis

We examined overall satisfaction with train services in Melbourne and find that the mean and median score of this is 5.28 and 6.0 respectively. Median score is 6, which shows that 50% percent of the respondents are very satisfied. Interestingly the mean response score is lower than (6). In order to understand the factors and the variables that contributed to this overall satisfaction and identify the improvements necessary to improve the satisfaction rating, we have used regression analysis (model 1) to examine the relationship between overall satisfaction of passengers and the factors developed in section 3.2.

In addition, as mentioned earlier a further regression analysis (model 2) was carried out using the overall satisfaction score as the independent variable and the seven factors and the six discarded variables namely, bus interchange, car parking, time to get in and get off, travel time considering the distance, manner of ticket checking staff and frequency of ticket checked as the predictor variables. This has been done to see whether the current R square value (model 2) has been improved from the previous value (model 1) of 0.370 with the addition of the discarded variables and also to see how the discarded values regressed with the overall satisfaction score. The regression analysis results for model 1 and model 2 along with the coefficient and t-statistics are given in the **table 4** below:

Table 4 Regression Analysis, Model comparison

	Model 1		Model 2	
Variable	Coefficient	t-statistics	Coefficient	t-statistics
Constant	5.28	846.62***	4.89	87.46***
Safety	0.18	28.76***	0.18	26.83***
Comforts	0.43	68.49)***	0.41	59.64***
Service Delivery	0.55	88.92***	0.53	75.58***
Facilities	0.13	19.99***	0.12	17.68***
Staff Impact	0.10	16.51***	0.10	14.53***
Information	0.28	45.32***	0.27	41.20***
Ticketing	0.27	43.94***	0.26	39.01***
Bus interchange			-0.00	-0.77(ns)
Car parking			-1.13	0.26(ns)
Frequency ticket checked			-0.00	-1.74(ns)
Time to get on and off			-0.01	-0.96(ns)
Travel time considering distance			0.08	13.21***
Manner of ticket checking staff			0.01	2.73**
R^2	0.370		0.375	
F		2583.07		1407.68
P-value		0.000		0.000

*** Significantly different from zero at the 1% level: ** significantly different at the 5% level
 ns – not significant at 5% level

It was found that the new R square value for model 2 is 0.375, showing only a marginal increase from the R square value (0.370) for the model 1 - only by 0.5%. It shows that the addition of those omitted variables to the factor analysis would have not contributed much and altered the results. The "travel time considering the distance" and "manner of ticketing staff" are the only variables that are found to be significant, but their coefficients are low in relation to the coefficient values of the seven factors. All the other discarded variables are not statistically significant at $p < 0.05$ probability level. This justifies the omission of the discarded variables from the factor analysis.

On the basis of multiple regression analysis, using the factors as the independent variables, the order of the factors in terms of their affect on overall satisfaction is seen in table 4 and is

as follows: service delivery (0.55), comfort (0.43), information (0.28), ticketing (0.27), safety (0.18), facilities (0.13) and staff impact (0.10).

We found that all seven factors are significantly related with overall satisfaction. However, the magnitude of the coefficients for the factors "safety", "facilities", and "staff impact" are very small. This indicates a very low contribution towards the overall satisfaction score, and that improvements in these factors will increase the overall satisfaction score.

Safety achieved a low average satisfaction score; however factor analysis shows safety has a strong impact on satisfaction. Furthermore, regression analysis highlights that safety does not currently add much to the overall satisfaction score. This further reinforces our finding in sections 3.1 and 3.2 that customers concern for safety is the most important customer satisfaction attribute for train travelers in Melbourne..

4   Conclusion

This study examines passengers' perception of the quality of train services in Melbourne using univariate analysis, factor analysis and regression analysis. Using factor analysis, we confirmed the validity of the major groupings used in the customer satisfaction questionnaire, except for a few minor changes. We found that passengers consider safety related issues in the train as well as at the station to be very important. This shows that improvements to safety will enhance the passengers' satisfaction level considerably.

Common factors were identified through factor analysis and then used in a regression analysis to identify the relationship between these factors and overall satisfaction with train services. We identified that the following factors contribute to satisfaction with the quality of the train service: **"safety"**, **"comfort"**, **"service delivery"**, **"facilities"**, **"staff impact"**, **"ticketing"** and **"information"**. Despite the contribution of these factors to satisfaction, the magnitude of the coefficients for the factors **"comforts"** and "**service delivery**" were very high. These factors already contribute very significantly to satisfaction with the quality of the train service. Conversely the magnitude of the coefficients for **"safety"**, **"facilities"** and **"staff impact"** are very low and do not currently contribute much to overall satisfaction.

Overall we find that passengers consider improvements to safety in the train as well as at the station to be very important. To some extent, they also consider improvements in facilities and cleanliness to be important. However the customers' perceptions were found to vary with gender, age, frequency of travel and time of travel. Also Douglas Economics (2006) has reported that service reliability was the worst rated attribute and passengers making off-peak medium distance trips tended to rate higher and passengers making peak medium distance trips tended towards lower ratings. Furthermore in their survey the passengers were asked to allocate $100 across a list of improvements to show which improvements would most improve their travel. This information will no doubt assist more when making decisions about upgrading or improving the train services.

The above conclusion is mainly based on survey results of customer perceptions and only identified the areas for improvements which would enhance customer satisfaction. We have not done any time series analysis to study variations of the customers' perception over time That is beyond the scope of this paper. In addition, it must be noted that passenger preferences will not necessarily always translate into passenger growth. Any analysis of the survey results needs to be validated against observation of the real world. The customer satisfaction survey is, fortunately, 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. However it is possible to take customer perceptions into account when making decisions which have an impact on passenger

services. This can assist the industry in making more informed decisions about upgrading or improving the rail net work.

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