PUBLIC TRANSPORT MODE SATISFACTION IN CAPE TOWN: Findings of a passenger intercept survey

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ABSTRACT

As limited resources are invested into new public transport systems in contemporary South African cities, and as challenges to the successful operation of these systems intensify, there will be an ongoing need for reliable measures of passenger satisfaction to gauge how well users' needs and expectations are being matched. This paper reports upon the findings of an indicative study conducted in 2009 in order to gain insight into public transport passenger attitudes and perceptions in Cape Town. The study was a (n=993) passenger satisfaction intercept survey which collected data from train, bus and minibus-taxi passengers, as well as from a small sub-sample of non-users. The method developed to assess passenger satisfaction, based upon a 'six-step user disgruntlement' technique developed in Manchester in 1997, differs from the passenger satisfaction questions included in the National Household Travel Survey of 2003, in that respondents are asked about both their satisfaction with, and the importance they attach to, different service attributes. This enables greater insight into the relative importance of service attribute dissatisfaction, and into the priority that should be accorded to service attribute upgrade. The paper concludes with a critical discussion on the methods applied, and on the insights gained into passenger satisfaction and likely user support for particular types of system improvement.

1. INTRODUCTION

South African cities are currently investing in new public transport infrastructure and systems at a scale unprecedented in the democratic era. As the new systems come into operation, as decisions on whether to invest limited resources into new phases of system improvement are contemplated, and as the consequences of a realignment of public transport market share from existing to new operators unravel, important questions for those involved in funding, planning, regulating and operating public transport systems will revolve around changing passenger expectations and satisfaction. Such questions include: how dissatisfied are passengers with existing services; what service attribute improvements in existing systems should be prioritised; is the introduction of costly new mode types justified; do the new systems introduced meet or exceed passenger expectations; are new 'choice passengers' being attracted; and do politically difficult decisions to counter resistance to change among existing operators have the support of passengers? Recent debates around the likely impact of proposed Bus Rapid Transit (BRT) systems have focussed on potential impacts on those earning a livelihood in the minibus-taxi sector. Emerging political and technical positions on whether these BRT systems should be implemented are largely being taken on the basis of whether or not the impact on the minibus-taxi sector will be positive, and indeed, whether or not the sector will resist implementation at a sufficiently large scale to render BRT services inoperable. A

voice often missing in these debates has been that of present and prospective public transport users, expressing their concerns and needs.

There is a need, therefore, for reliable, ongoing measures of public transport satisfaction. The attitudinal data collected in the 2003 National Household Travel Survey (NHTS) provide a useful baseline (DoT 2005). Section 7 of the NHTS questionnaire asked respondents which of seven listed attributes were deemed to be important when travelling, and went on to ask non-users of the different public transport modes why they do not use the mode, and users, whether they are satisfied with a list of 13 to 15 service attributes using a Likert rating scale (from 'very satisfied', 'satisfied', 'dissatisfied', to 'very dissatisfied'). Analysis of these data enabled a ranking of service attributes for each mode based on the percentage of respondents who indicated they were 'dissatisfied' or 'very dissatisfied' with each attribute (see section 10.4 of DoT 2005). A shortcoming of the method used in the NHTS is that service attributes were only rated on the basis of satisfaction, and not on importance. Accurate prioritisation of service attributes requiring improvement from a passenger perspective is therefore made difficult, as two attributes may be deemed to be equally dissatisfactory, but their relative importance to respondents cannot be easily determined. For instance, travel time and in-vehicle security might record equal dissatisfaction ratings, but in-vehicle security might be regarded as much more important to users than travel time. The method does not allow for differences like these to be analysed.

The aim of this paper is to explore an alternative method capable of measuring both satisfaction and importance, and to report upon the improved insights into public transport passenger attitudes and perceptions possible through the application of this method in an indicative study conducted in Cape Town. The paper is divided into four sections. The following section discusses the survey method that was developed, and how data were collected and analysed. Section 3 discusses the findings of the study. Section 4 concludes with critical reflection on the method used, and with a tentative discussion on the insights the indicative findings have for likely user support for BRT systems and acceptance of any possible downscaling of BRT to 'enhanced bus' systems due to budget constraints or minibus-taxi resistance.

2. METHOD

A non-exhaustive review of the recent literature on public transport passenger satisfaction studies revealed that approaches to satisfaction measurement can be categorised on the basis of whether they adopt qualitative or quantitative methods.

An example of a qualitative approach is a study undertaken by Beirão and Cabral (2007) in which semi-structured, in-depth interviews were conducted with 24 passengers. An alternative to personal in-depth interviews is focus group discussion, as conducted, for instance, by Guiver (2007) with respect to mode perceptions and user experiences. The purpose of such qualitative methods, be they applied on a personal or group basis, is to gain detailed and nuanced insights into user evaluations of, and attitudes towards, transport services not possible in structured quantitative interviews.

Quantitative methods of satisfaction measurement in the public transport sector have typically taken the form of Likert rating of service attributes, and can be broken into two main categories.

In the first category, service attribute importance rating, as a complement to satisfaction rating, is derived statistically using correlation coefficients or regression coefficients (Abalo *et al* 2007, Bacon 2003, Gustafsson and Johnson 2004). (See Gustafsson and Johnson 2004 for a detailed description and comparative evaluation of various statistical methods, in the form of multiple regression, normalised pairwise estimation, partial least squares, and principal components regression.) An example is Brons *et al*'s (2009) analysis of Dutch Railways customer satisfaction survey data, and the use of regression to derive the relative importance of service attributes.

In the second category of quantitative methods, service attribute importance rating comes directly from respondents in interviews. An example is the multi-case study undertaken by Stradling *et al* (2007), based on a technique developed in Manchester in 1997. In this technique measures of performance (i.e. 'how well is this aspect of a service being delivered?') and importance (i.e. 'how important is it to you that this aspect is delivered well?') are combined to give a measure labelled 'user disgruntlement'. The authors summarise the six steps involved in the technique as follows: (1) identification of salient attributes of service delivery from discussion with customers and providers and a review of the relevant literature; (2) a survey of present, prospective or past users to rate importance of, and performance on, each attribute; (3) cross-tabulation of importance and performance ratings to compute the percentage of disgruntled users for each attribute; (4) a plot of disgruntlement against importance for all attributes; (5) a prioritisation by dividing the plot into four quadrants; and (6) identification of service attributes in need of priority attention. (While not acknowledged explicitly, this method is clearly based upon an Importance-Performance Analysis [IPA] technique developed in the field of market research by Martilla and James [1977].)

Whether importance measures should come directly from respondents in interviews, or be derived statistically, has been the subject of considerable debate. Studies that have compared the reliability of importance assessment using direct and indirect methods, have generally concluded that direct measures are more valid than correlations or regression coefficients (see Bacon 2003, Gustafsson and Johnson 2004, and Griffin and Hauser 1993).

The research method adopted in the study reported upon in this paper is a modification of the 'six-step user disgruntlement' technique developed by Stradling *et al* (2007), on the grounds that this technique would involve minimal adjustment to the methods of satisfaction measurement already applied in the NHTS, and, therefore, could potentially be fairly easily included in future versions of the national survey. The main modifications to Stradling *et al*'s (2007) technique relate to analysis of mean satisfaction and importance ratings, as opposed to percentage ratings, on the grounds that this enables all respondents' views to be reflected in analysis, and that this approach better enables comparisons across modes through the calculation of weighted satisfaction rating means for consistent service attribute categories. (It is perhaps worth noting that in their seminal paper on Importance-Performance Analysis, Martilla and James [1977] applied mean values in analysis.) The plot of weighted service attribute category satisfaction rating means against service attribute category importance rating means reflects, to some extent however, the plot of disgruntlement against importance applied by Stradling *et al* (2007).

The study, in the form of a (n=993) passenger satisfaction intercept survey, was conducted in 2009 at public transport facilities along a ±4 km section of the southern suburbs rail corridor in Cape Town, stretching from Claremont station in the south to Mowbray station in the north. This section includes two large public transport interchanges at either end

(Claremont and Mowbray), and three rail stations in between (Newlands, Rondebosch and Rosebank). While the choice of study area was largely pragmatic, given that field work was conducted by University of Cape Town students (Rahube 2009, Tladi 2009, Tsanwani 2009), it does offer exposure to a fairly diverse cross-section of the public transport passenger market, travelling from an array of areas within the city. The racial distribution of respondents (53.6% Black, 29.8% Coloured, 4.4% Indian and 12.0% White) provides a crude proxy for income and residential location diversity.

The data collection and analysis method began with focus group discussions amongst train, bus and mini-bus taxi users to identify and verify a list of service attributes for inclusion in a short intercept questionnaire. For each public transport mode a slightly modified questionnaire was developed in which a list of service attributes was kept as consistent as possible for comparison purposes. The first part of the questionnaire asked questions relating to respondent age, car access, commute mode, frequency of use, and type of ticket purchased (in the case of train and bus). The second part asked for Likert satisfaction ratings (from 'strongly agree', 'agree', 'neutral/do not know', 'disagree' to 'strongly disagree') in relation to a list of 31 to 34 statements (depending on mode) regarding service attributes, divided into categories relating to safety and security, waiting conditions, costs, transfers, reliability, and on-board conditions. Following satisfaction rating, respondents were asked to indicate the importance they attached to the service attribute (from 'very unimportant',' unimportant', 'neutral/do not know', 'important' to 'very important'). Interviewers were recruited and trained, and the questionnaire underwent a pilot test which led to some minor modifications to questions and attribute statements.

Table 1. Respondents, by current commute mode (n=993)

			Train survey	%	Bus survey	%	Minibus-taxi survey	%	All respondents	%
Users			257	*70.2*	236	*72.8*	217	*71.6*	710	*71.5*
Non-users	other public transport modes	train	n.a.	*n.a.*	17	*5.2*	14	*4.6*	31	*3.1*
		bus	34	*9.3*	n.a.	*n.a.*	20	*6.6*	54	*5.4*
		minibus-taxi	8	*2.2*	23	*7.1*	n.a.	*n.a.*	31	*3.1*
	private transport modes	car driver	20	*5.5*	37	*11.4*	38	*12.5*	95	*9.6*
		car passenger	13	*3.6*	4	*1.2*	4	*1.3*	21	*2.1*
	walking		17	*4.6*	4	*1.2*	7	*2.3*	28	*2.8*
	private transport and walking		2	*0.5*	1	*0.3*	0	*0.0*	3	*0.3*
	private and public transport		8	*2.2*	0	*0.0*	0	*0.0*	8	*0.8*
	public transport and walking		2	*0.5*	0	*0.0*	0	*0.0*	2	*0.2*
	other mode		2	*0.5*	2	*0.6*	2	*0.7*	6	*0.6*
	item non-response		3	*0.8*	0	*0.0*	1	*0.3*	4	*0.4*
All respondents			366	*100*	324	*100*	303	*100*	993	*100*

Note: The sample sizes indicated in the titles of figures 1 to 4 are slightly greater than the number of 'users' indicated in this table. This is because, in the analysis carried out of user satisfaction, 'users' were defined as respondents who had used the particular public transport mode within the previous year. In a number of instances such 'users' indicated that their current commute mode was another form of transport.

In the main survey, interviewers were instructed to intercept passengers at stations, stops and ranks in the weekday afternoon peak, and were provided with respondent quotas to ensure balance across gender and public transport modes, as well as the inclusion of a smaller group of non-users. Table 1 presents respondents' current commute mode. Before embarking upon data collection, permission to conduct the intercept surveys at interchanges and on station platforms was obtained from the relevant authorities. A fairly

even distribution of respondents across public transport modes was achieved (29.0% train vs. 29.4% bus vs. 25% minibus-taxi), as well as across gender (48.5% male vs. 51.1% female). The number of young adults in the sample was disproportionately large, however, with 28% of respondents falling between 21 and 25 years in age – the likely skew this introduced in data analysis is discussed in the following section.

A problem encountered in the survey took the form of threats of violence issued to interviewers by mini-bus taxi drivers at the Claremont and Mowbray public transport interchanges, and accusations that the interviewers were in some way working for, and advancing the interests of, the City of Cape Town's Integrated Rapid Transit project. For this reason, midway through the data collection period the site of intercept for bus and mini-bus taxi passengers was restricted to the Main Road where there was no obvious connection between the interviewers and the public transport system. The impact this may have had on sampling bias is unclear.

Following data collection, questionnaire responses were coded into a flat-line database. In the data capturing process it was necessary to ensure that codes accurately reflected either a negative or positive rating – this required that rating codes for positively worded service attribute statements (e.g. 'you can be confident that the taxi will not break down or be involved in a crash') were inverted to be consistent with the rating codes of negatively worded attribute statements (e.g. 'taxi drivers do not obey traffic laws, and sometimes drive too fast'). The main form of data analysis conducted was tabulation of satisfaction and importance ratings, and ranking of service attributes on the basis of performance percentages and means. To facilitate public transport mode comparisons, given that service attribute statements had to vary on the basis of differing modal operating characteristics, mean ratings for service attribute categories were calculated and weighted according to the relative importance attached to individual attributes within the category. This enabled a series of satisfaction and importance plots within modes, across modes, and on the basis of various filters to explore variation according to gender, age group, and proxies for income. Plots were divided into quadrants on the basis of a data centroid (i.e. a plot of the mean of all satisfaction ratings against the mean of all importance ratings), in order to distinguish (dis)satisfaction with important attributes, from (dis)satisfaction with unimportant attributes.

3. FINDINGS

The data analysis findings are discussed in this section. The discussion is structured in terms of: satisfaction ranking; mode satisfaction against importance plotting; modal comparisons; and socio-demographic variation in satisfaction and importance ranking.

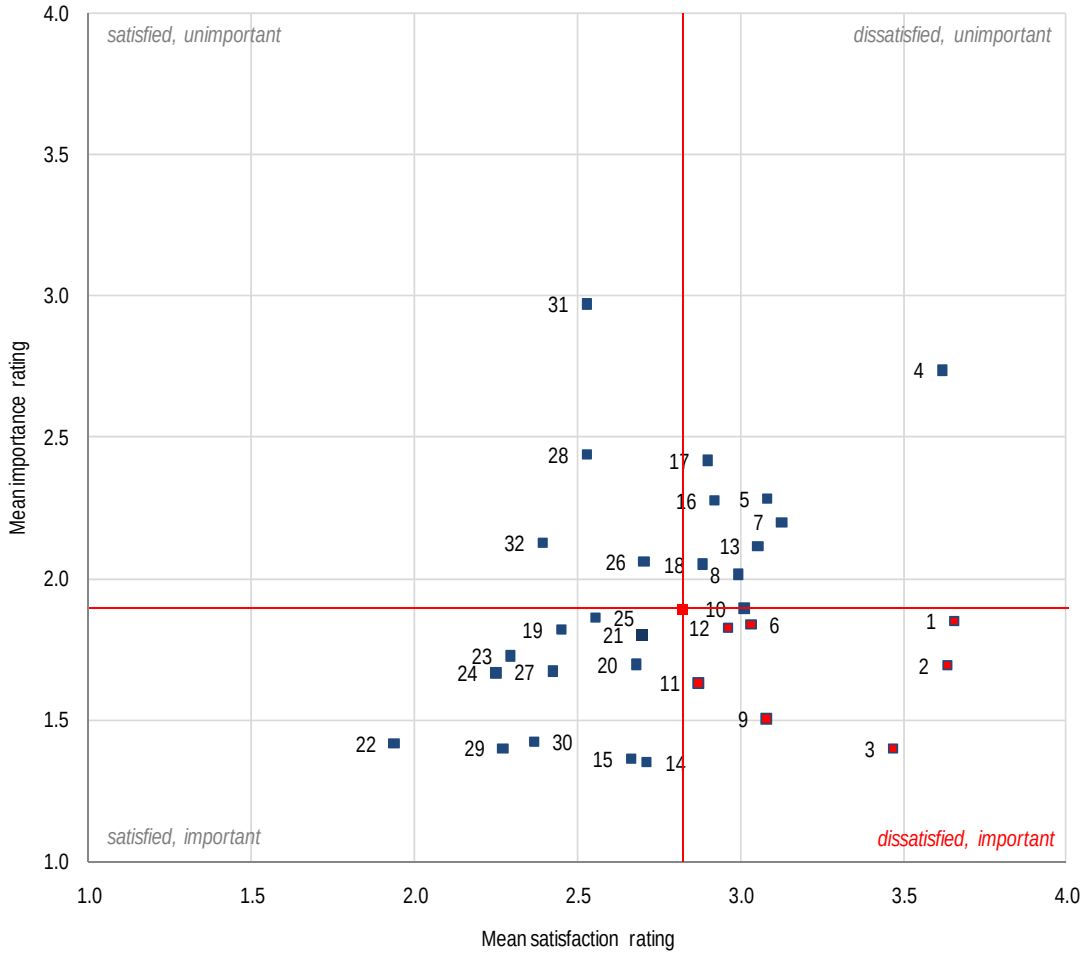
The starting point in analysing the dataset was to rank the service attributes for each mode according to their satisfaction and importance rating. Appendix A presents a service attribute satisfaction ranking on the basis of the percentage of respondents who indicated that they disagreed or strongly disagreed with the service attribute performance statement. The table also indicates a ranking on the basis of the mean rating. A comparison of the percentage and mean rankings indicated a broad pattern of similarity (the correlation coefficients for the respective rankings are high – 0.9058 for train rankings, 0.9905 for bus ranking and 0.9444 for minibus-taxi rankings), but some difference. Attribute ranking is therefore sensitive to the choice of ranking technique applied – the implications of this for further methodological research are discussed in the concluding section. Appendix B presents service attribute importance ranking on the same basis, and a similar pattern can be observed.

With regard to train service attributes, issues relating to overcrowding and seating within carriages featured prominently as attributes associated with high levels of dissatisfaction, as well as safety concerns associated with on-board security and open doors. In the case of bus service attributes, issues relating to travel time, bus stop facilities and service reliability featured prominently as attributes with high levels of dissatisfaction. In the case of minibus-taxi service attributes, dissatisfaction with driver behaviour, overcrowding and rank facilities featured prominently. The value of introducing importance rating in passenger satisfaction measurement was illustrated by the dissimilarity between the satisfaction and importance rankings. Graffiti on trains presented a good example – it was ranked high on the dissatisfaction rankings, and low on the importance ranking (4 [60.7%] vs. 31 [51.5%] out of 32 attributes).

Direct comparison with the Western Cape findings of the NHTS (see tables 10.13, 10.15 and 10.17 of DoT 2005) was not possible because the list of service attributes included in the two surveys was not the same. Nevertheless some differences and similarities could be identified. Similarities included the prominence of overcrowding and security dissatisfaction with train services, stop facility dissatisfaction with bus services, and vehicle reliability, overcrowding and rank facility dissatisfaction with minibus-taxi services. A significant dissimilarity is the relative overall dissatisfaction across modes. In the NHTS, train services recorded the highest rates of overall dissatisfaction (49%), followed by minibus-taxi (38%) and bus (24%) services. In comparison, on the basis of unweighted means of the satisfaction percentage ranking in appendix A, passengers appeared to be more dissatisfied with minibus-taxi services overall (47%), rather than with bus (36%) and train (34%) services.

Figures 1 to 3 plot mean satisfaction rating against mean importance rating for train, bus and minibus-taxi services. In each figure the numbering of the service attributes that are plotted in the chart is based upon the percentage dissatisfaction ranking for that mode as presented in appendix A. A general observation across all three figures is that the plotted data centroid lies in the quadrant of the chart denoting both dissatisfaction and importance (i.e. a mean satisfaction rating of greater than 2.5 on the x-axis, and a mean importance rating of less than 2.5 on the y-axis). This indicates a ubiquitous disgruntlement with the level of service offered by all modes of public transport. A further observation is the tighter concentration of minibus-taxi service attributes around the data centroid – indicating more uniform service dissatisfaction than is the case with train and bus services.

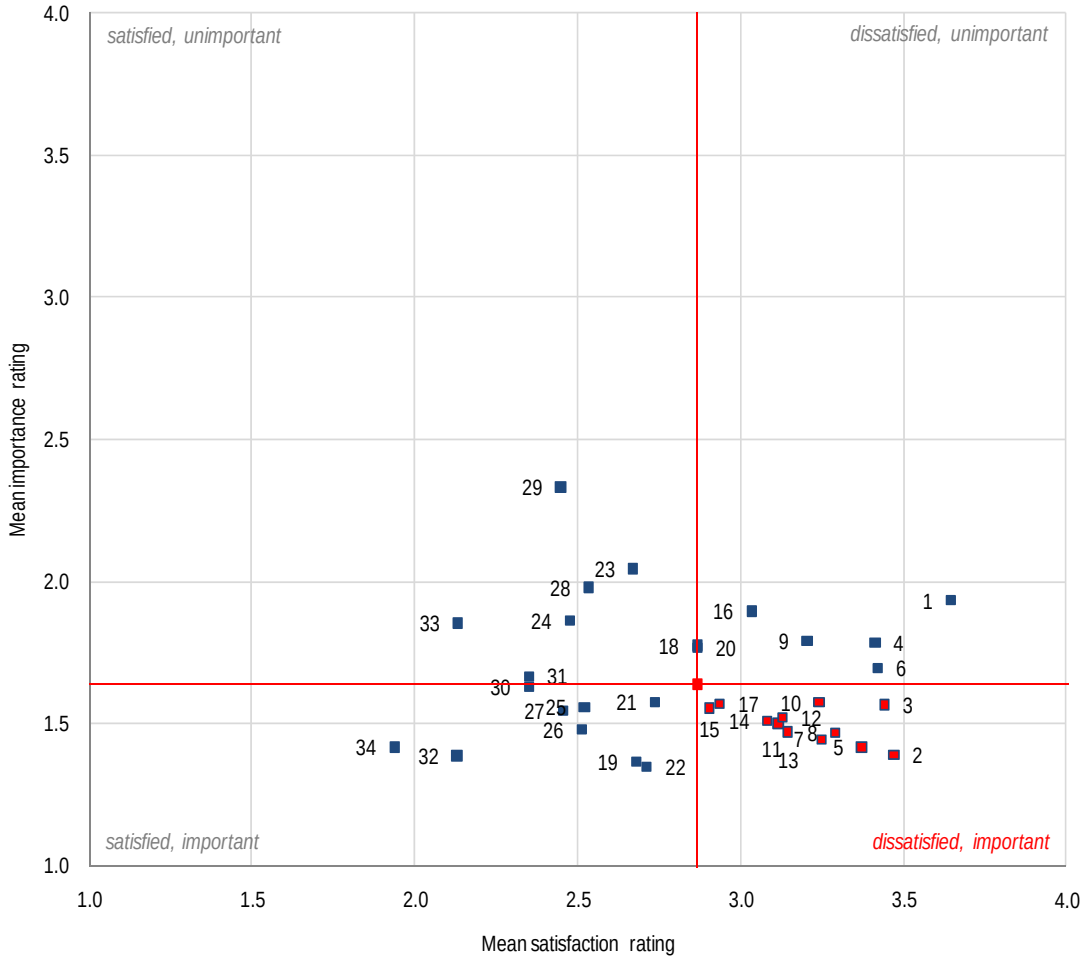
In figure 1, the train service attributes that appear in the high importance and dissatisfaction quadrant, as defined by the data centroid plot, include (the service attribute performance statement appears in parenthesis): seat availability (‘Trains always have seats available.’); in-vehicle overcrowding (‘Trains are often overcrowded.’); in-vehicle security personnel (‘There are enough security guards on trains.’); open doors (‘Carriage doors are often open during journeys, and this makes you unsafe.’); service punctuality (‘Trains often arrive late.’); station weather protection (‘There is enough protection from the weather at train stations.’); and service frequency (‘The waiting gap between train services is too long.’).



1	seat availability	10	seat comfort	19	ticket purchase	28	train bunching
2	in-vehicle overcrowding	11	station weather protection	20	station staff customer care	29	station pax. information
3	in-vehicle security personnel	12	service frequency	21	vehicle cleanliness	30	station security
4	graffiti	13	station toilets	22	in-vehicle security	31	in-vehicle reading
5	seating density	14	vehicle reliability	23	boarding and alighting	32	driver behaviour
6	open doors	15	station security personnel	24	fare affordability		
7	service transfers	16	vehicle and station livery	25	travel speed		
8	station seating	17	passenger politeness	26	in-vehicle temperatures		
9	service punctuality	18	in-vehicle staff cust. care	27	station cleanliness		

Figure 1. Train user service attribute mean satisfaction rating vs. mean importance rating (n=277)

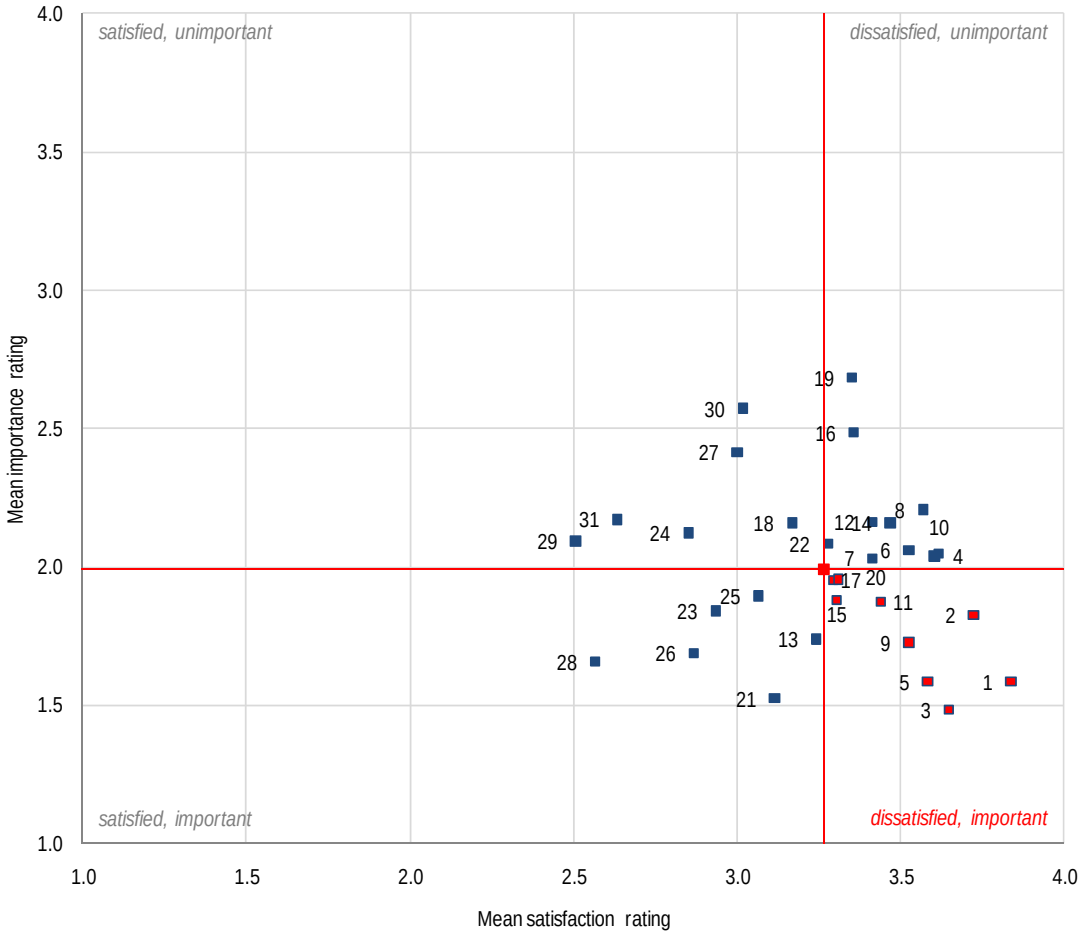
In figure 2, the bus service attributes that appear in the high importance and dissatisfaction quadrant, include: bus stop weather protection (‘There is enough protection from the weather at bus stops.’); bus stop seating (‘There is enough seating at bus stops.’); service punctuality (‘Buses often arrive late.’); driver behaviour (‘Bus drivers do not obey traffic laws, and sometimes drive too fast.’); bus stop passenger information (‘It is easy to find information on timetables and routes at bus stops.’); service transfers (‘I would not mind using more than one bus to get to my destination.’); interchange weather protection (‘There is enough protection from the weather at bus interchanges.’); seat availability (‘Buses always have seats available.’); fare affordability (‘Bus tickets do not cost too much.’); interchange security personnel (‘There are enough security guards at bus interchanges.’); interchange seating (‘There is enough seating at bus interchanges.’); and bus stop cleanliness (‘Bus stops are clean.’).



1	travel speed	10	service transfers	19	bus stop security	28	passenger politeness
2	bus stop weather protection	11	PTX weather protection	20	in-vehicle temperatures	29	in-vehicle reading
3	bus stop seating	12	seat availability	21	PTX staff customer care	30	in-vehicle staff customer care
4	seating density	13	fare affordability	22	vehicle reliability	31	interchange cleanliness
5	service punctuality	14	PTX security personnel	23	vehicle and stop livery	32	interchange security
6	service frequency	15	interchanging seating	24	ticket purchase	33	boarding and alighting
7	driver behaviour	16	bus bunching	25	seat comfort	34	in-vehicle security
8	bus stop pax. information	17	bus stop cleanliness	26	interchange pax. information		
9	in-vehicle overcrowding	18	interchange toilets	27	vehicle cleanliness		

Figure 2. Bus user service attribute mean satisfaction rating vs. mean importance rating (n=240)

In figure 3, the minibus-taxi service attributes that appear in the high importance and dissatisfaction quadrant, include: driver behaviour (‘Taxi drivers do not obey traffic laws, and sometimes drive too fast.’); in-vehicle overcrowding (‘Taxis are often overcrowded.’); vehicle reliability (‘You can be confident that the taxi will not break down or be involved in a crash.’); rank security personnel (‘There are enough security guards at taxi ranks.’); rank cleanliness (‘Taxi ranks are clean.’); seat comfort (‘Seats on taxis are comfortable.’); rank weather protection (‘There is enough protection from the weather at taxi ranks.’); law compliance (‘Passengers are often inconvenienced by taxis being pulled over by traffic police.’); rank staff customer care (‘The staff at taxi ranks are friendly and helpful.’);



1	driver behaviour	10	rank toilets	19	in-vehicle reading	28	service availability
2	in-vehicle overcrowding	11	seat comfort	20	rank staff customer care	29	travel speed
3	vehicle reliability	12	in-vehicle waiting	21	rank security	30	passenger politeness
4	ranking seating	13	fare affordability	22	in-vehicle staff customer care	31	boarding and alighting
5	rank security personnel	14	vehicle and rank livery	23	rank passenger information		
6	seating density	15	rank weather protection	24	cash-based fares		
7	service transfers	16	taxi bunching	25	vehicle cleanliness		
8	in-vehicle music	17	law compliance	26	in-vehicle security		
9	rank cleanliness	18	journey time reliability	27	in-vehicle temperatures		

Figure 3. Minibus-taxi user service attribute mean satisfaction rating vs. mean importance rating by users (n=227)

Figure 4 plots weighted mean service attribute category satisfaction ratings against their equivalent importance ratings, to enable an intermodal comparison of disgruntlement. The plot area is divided into equal quadrants (as opposed to the unequal data centroid division applied in figures 1-3). The location of almost all plots within the quadrant indicating both dissatisfaction and importance, supports the earlier observation that the public transport system as a whole appears to be failing to meet the expectations of the Cape Town passenger market – only one service attribute category (train costs) is plotted in the quadrant indicating that the composite of service attributes are deemed to be both satisfactory and important. A comparison of the rating of attribute categories across modes also supports the earlier observation that minibus-taxi users are more disgruntled on the whole, followed by bus and train. Both of these observations, however, are valid only in so far as the respondent sample represents the body of passengers utilising public transport services in the study area, and the study area represents the entire metropolitan area. A limitation of the study is that the sample can only be claimed to be indicative, not representative. The service attribute categories exhibiting the greatest user disgruntlement include: bus stop conditions; in-vehicle taxi safety; bus service reliability; minibus-taxi rank conditions; and bus transfers.

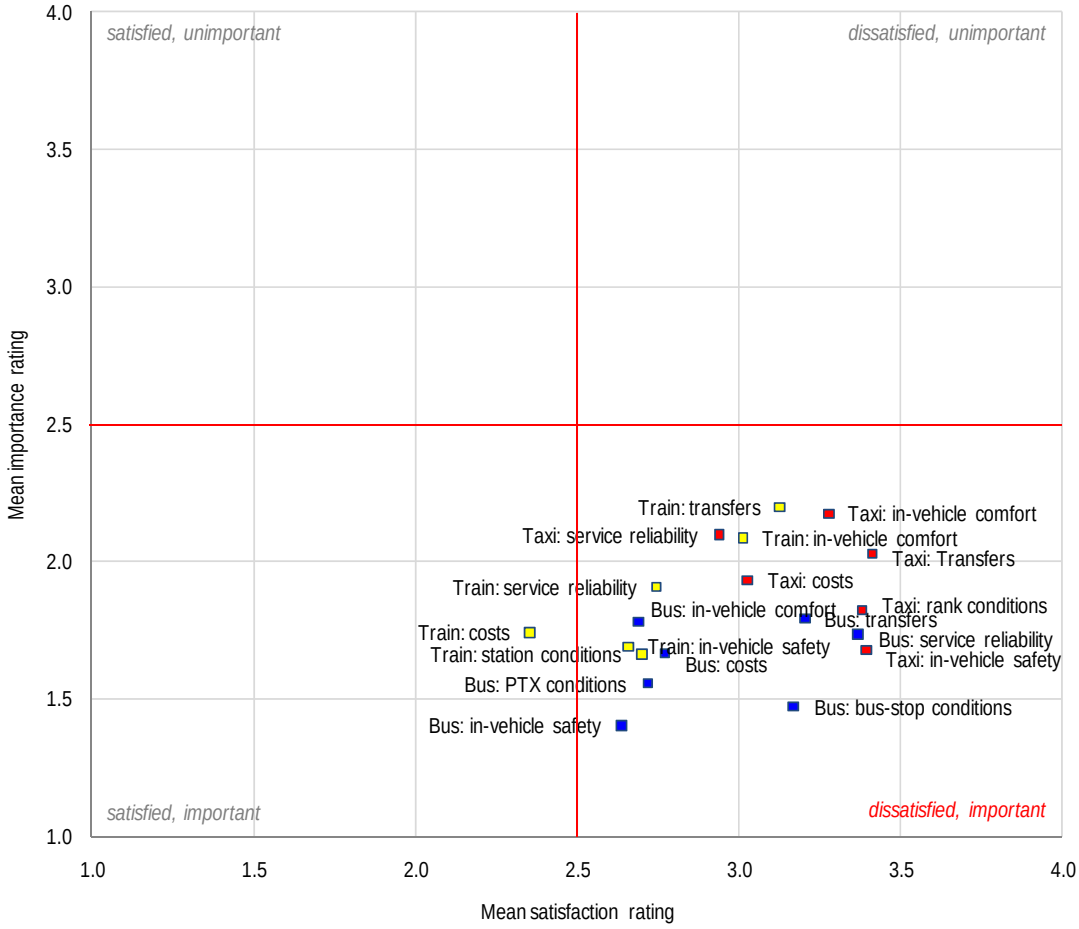
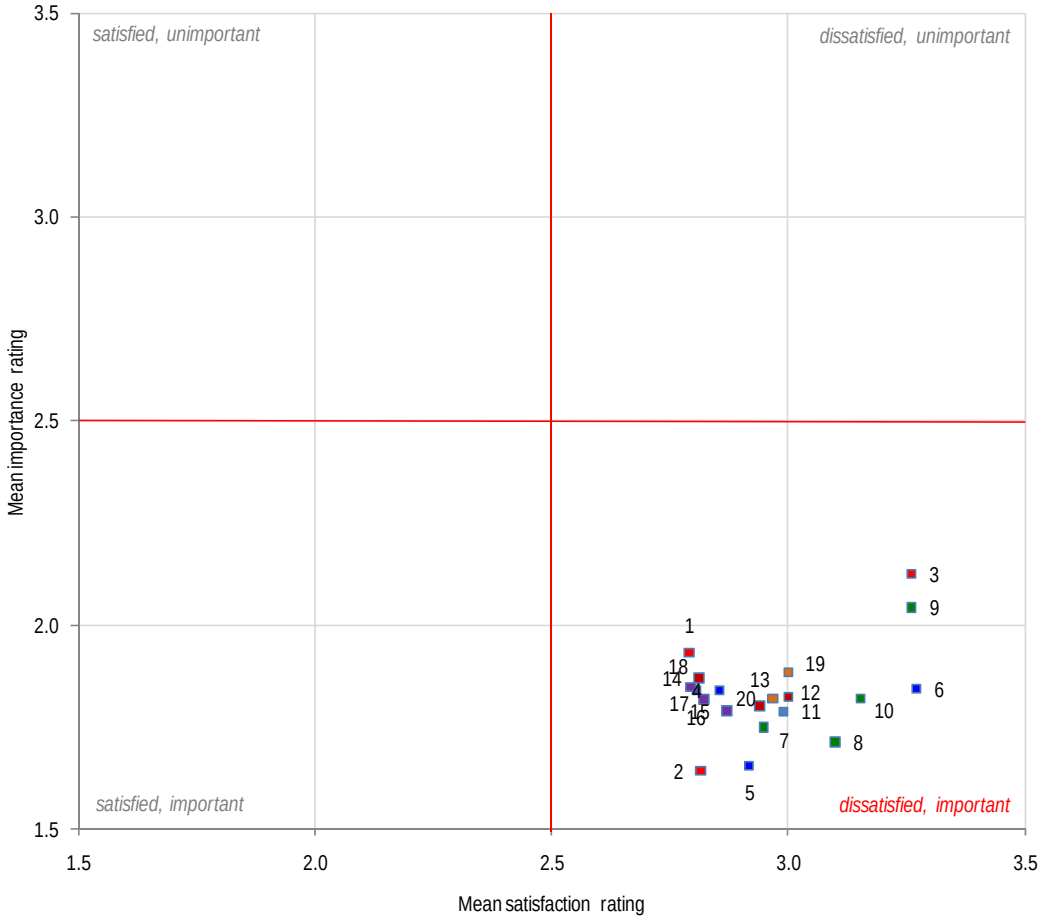


Figure 4. User weighted service attribute category mean satisfaction rating vs. mean importance rating, by public transport modes (n=744)

Space does not permit the presentation of the full analysis undertaken to explore socio-demographic variations in findings. Figure 5 attempts to summarise findings in this regard by plotting the data centroids (as an indicator of aggregate user disgruntlement) of a selection of the socio-demographically filtered investigations that were undertaken. Here too the plot area is divided into equal quadrants, rather than by data centroid. Unsurprisingly, given the general pattern of disgruntlement that emerged from aggregate analysis, a feature of this socio-demographically filtered analysis is the generally high level of dissatisfaction across all groups. In essence, variation relates to degrees of user disgruntlement.

Figure 5 illustrates socio-demographic variations on the basis of gender, age group, race and car access. With regard to gender, female users (plots 1-3) are consistently more disgruntled than male users (plots 4-6) for each of the three public transport modes. Dissatisfaction with minibus-taxi services accounts for the three plots furthest along the dissatisfaction axis (plots 3, 9 and 6), of which female taxi users (plot 6) appear to be the most dissatisfied segment of the public transport passenger market. With regard to age group, younger public transport users appear to be more dissatisfied with service quality than older users, but only marginally so. This suggests that the age bias in the sample, mentioned in section 2, did not skew analysis greatly. With regard to race and car access, perhaps unsurprisingly, perceptions of poor public transport service quality are stronger amongst car users (plot 10), than the disgruntlement exhibited by public transport users (plot 11) – suggesting that either there are greater service quality expectations amongst more affluent passengers, or that misperceptions of service quality exist amongst this

group. Interestingly, public transport disgruntlement amongst users is surprisingly similar across categories that are conventionally regarded in South Africa to serve as a proxy for income – neither racial classification (plots 15-18), nor access to a car (plots 19-20), exhibit great difference.

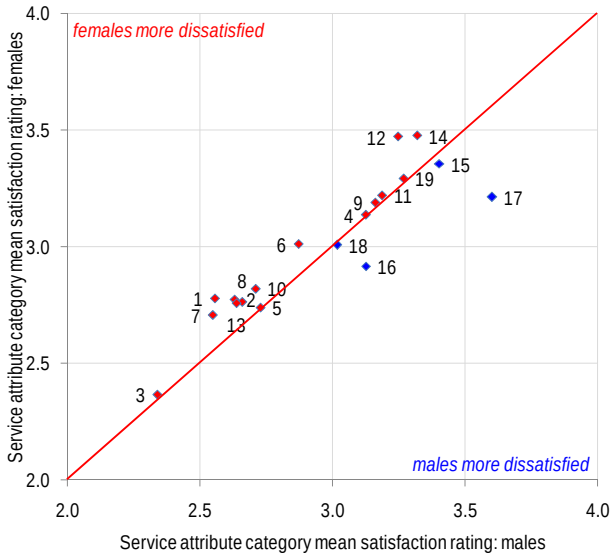


1	train: male users	6	taxi: female users	11	all PT modes: PT users	16	all PT modes: Coloureds
2	bus: male users	7	train: car users	12	all PT modes: 16-30 year olds	17	all PT modes: Indians
3	taxi: male users	8	bus: car users	13	all PT modes: 31-50 year olds	18	all PT modes: Whites
4	train: female users	9	taxi: car users	14	all PT modes: 51-80 year olds	19	all PT modes: PT users with car access
5	bus: female users	10	all PT modes: car users	15	all PT modes: Blacks	20	all PT modes: PT users w/t car access

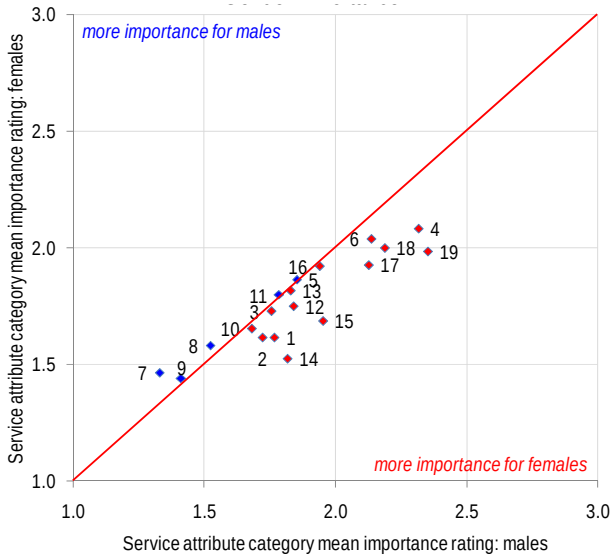
Figure 5. Public transport mode service attribute data centroid satisfaction rating vs. data centroid importance rating, by gender, age group, race and car access (n=993)

Given that gender emerged as the strongest socio-demographic variation amongst public transport users, figure 6 explores gender variation further. Part (a) of the figure plots weighted service attribute category satisfaction ratings, male against female. Part (b) plots mean service attribute category importance ratings, male against female. In both charts, a plot located on the diagonal would indicate that male and female respondents rated the particular service attribute category equally. The two charts illustrate a fairly consistent pattern of greater female dissatisfaction with, and concern for, service attribute categories. In part (a), the plots (15-18) that break this pattern are greater male dissatisfaction with minibus-taxi attribute categories relating to ranks, costs, transfers and reliability. In part (b) the plots (7-11 and 16) that break this pattern are greater male importance attached to bus attribute categories relating to safety, stops, costs and transfers, and to minibus-taxi costs. In all other instances, females are more dissatisfied or deem the attribute category to be of greater importance.

(a) *weighted service attribute category mean satisfaction rating*



(b) *service attribute category mean importance rating*



1	train: in-vehicle safety	6	train: in-vehicle comfort	11	bus: transfers	16	taxi: costs
2	train: station conditions	7	bus: in-vehicle safety	12	bus: service reliability	17	taxi: transfers
3	train: costs	8	bus: interchange conditions	13	bus: in-vehicle comfort	18	taxi: service reliability
4	train: transfers	9	bus: bus-stop conditions	14	taxi: in-vehicle safety	19	taxi: in-vehicle comfort
5	train: service reliability	10	bus: costs	15	taxi: rank conditions		

Figure 6. Male vs. female service attribute category satisfaction and importance rating, by public transport mode (n=828)

4. CONCLUSIONS AND RECOMMENDATIONS

The aims of this paper were to explore a data collection and analysis method capable of measuring both satisfaction and importance in public transport services, and to report upon any improved insights into public transport passenger satisfaction or likely user support for particular types of system improvement made possible through the application of this method.

With regard to method development, it is suggested that the data collection and analysis techniques reported upon in the paper, or variations thereof, would represent a worthwhile inclusion in future versions of the NHTS, or in other future surveys of public transport satisfaction. The paper has demonstrated that greater insight into satisfaction measurement can be obtained through the addition of service attribute importance rating. The most appropriate, or best, method for future application would need to be established from further research in which the dataset is subjected to different analytical techniques to test, through triangulation, sensitivity to method. More specifically, the full implications of analysing dissatisfied respondents by percentage, rather than by the mean rating of all respondents, for prioritising service attribute improvement needs to be established, as well as the difference that Stradling *et al*'s (2007) particular technique for calculating 'user disgruntlement' may have on outcomes. A further useful sensitivity test would an assessment of the impact, if any, of the ordering of satisfaction and importance questions in the respondent interview. This may have a conditioning effect, and studies to assess this were not found in the literature.

With regard to improved insight (recognising sample size limitations), one thing that is clear from the study – with respect to the unheard voice of the users discussed in the introduction to this paper – is that these users are ubiquitously dissatisfied. Useful further

research in this regard would be satisfaction rate benchmarking with cities with public transport systems that are generally regarded by practitioners to be good and bad. It would be interesting to establish whether passengers have a tendency to record high dissatisfaction irrespective of system quality, and, indeed, whether there is any value in cross-city comparison at all. Nevertheless, if public transport commuters are to be retained, and if new riders are to be attracted in Cape Town, it would appear that an overall service quality improvement is required.

It is difficult to judge from the evidence presented in this paper the breadth of public transport user (and non-user) support specifically for BRT versus 'enhanced bus' improvements. Certainly BRT improvements would address the top ranked dissatisfactory service attributes amongst bus and minibus-taxi users, but it is not impossible to improve many of these service attributes with less capital and human resource intensive bus improvements, ranging from so-called 'BRT-lite' to 'enhanced bus' (i.e. a range of bus service options using conventional vehicles within dedicated lanes and improved passenger information systems, but without the high-end station architecture, ticketing systems and articulated vehicles associated with full-specification BRT). Expressed dissatisfaction with stop and rank conditions (i.e. weather protection, seating, information, customer care, security and cleanliness), for instance, could be addressed irrespective of the type of running service, and expressed dissatisfaction with in-vehicle experiences (i.e. driver behaviour, vehicle reliability and seat comfort) could be improved across any bus service type. The expressed dissatisfactory attributes that would require particular bus service type improvements are service punctuality and travel time, as they need to be addressed through adequately enforced dedicated road space, and here physical enforcement though lane barriers, be they full BRT or 'BRT-lite', would have a clear advantage in prevailing South African law enforcement conditions.

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Appendix A. Service attribute percentage and mean dissatisfaction ranking, by public transport mode (n=993)

Train	% dissatisfied	rank	mean rating	rank
seat availability	66.7	1	3.7	1
in-vehicle overcrowding	63.8	2	3.6	2
in-vehicle security personnel	61.2	3	3.5	4
graffiti	60.7	4	3.6	3
seating density	46.2	5	3.1	6
open doors	45.8	6	3.0	9
service transfers	45.1	7	3.1	5
station seating	44.8	8	3.0	11
service punctuality	43.0	9	3.1	7
seat comfort	41.5	10	3.0	10
station weather protection	39.4	11	2.9	16
service frequency	37.9	12	3.0	12
station toilets	36.5	13	3.1	8
vehicle reliability	32.5	14	2.6	21
station security personnel	32.1	15	2.7	20
vehicle and station livery	32.1	16	2.9	13
passenger politeness	29.7	17	2.9	14
in-vehicle staff customer care	26.2	18	2.9	15
ticket purchase	26.1	19	2.4	26
station staff customer care	26.0	20	2.7	18
vehicle cleanliness	25.7	21	2.7	19
in-vehicle security	22.5	22	2.6	22
boarding and alighting	22.5	23	2.3	30
fare affordability	22.4	24	2.2	32
travel speed	21.0	25	2.6	23
in-vehicle temperatures	19.7	26	2.7	17
station cleanliness	18.8	27	2.4	27
train bunching	18.5	28	2.5	25
station passenger information	18.4	29	2.3	31
station security	17.8	30	2.4	29
in-vehicle reading	17.6	31	2.5	24
driver behaviour	15.5	32	2.4	28

Bus	% dissatisfied	rank	mean rating	rank
travel speed	64.2	1	3.6	1
bus stop weather protection	58.8	2	3.5	2
bus stop seating	58.8	3	3.4	3
seating density	57.9	4	3.4	5
service punctuality	54.6	5	3.4	6
service frequency	54.2	6	3.4	4
driver behaviour	51.7	7	3.3	8
bus stop passenger information	50.8	8	3.3	7
in-vehicle overcrowding	50.0	9	3.2	9
service transfers	50.0	10	3.2	10
interchange weather protection	48.3	11	3.1	13
seat availability	47.1	12	3.1	12
fare affordability	46.7	13	3.1	11
interchange security personnel	45.4	14	3.1	14
interchange seating	42.1	15	2.9	17
bus bunching	37.9	16	3.0	15
bus stop cleanliness	36.8	17	2.9	16
interchange toilets	33.3	18	2.9	18
bus stop security	32.9	19	2.7	22
in-vehicle temperatures	30.0	20	2.9	19
interchange staff customer care	29.2	21	2.7	20
vehicle reliability	26.3	22	2.7	21
vehicle and stop livery	24.6	23	2.7	23
ticket purchase	24.2	24	2.5	27
seat comfort	24.2	25	2.5	25
interchange pax. information	20.8	26	2.5	26
vehicle cleanliness	20.8	27	2.5	28
passenger politeness	18.8	28	2.5	24
in-vehicle reading	18.4	29	2.4	29
in-vehicle staff customer care	15.8	30	2.4	30
interchange cleanliness	13.3	31	2.4	31
interchange security	12.5	32	2.1	33
boarding and alighting	10.8	33	2.1	32
in-vehicle security	6.3	34	1.9	34

Minibus-taxi	% dissatisfied	rank	mean rating	rank
driver behaviour	70.9	1	3.8	1
in-vehicle overcrowding	66.1	2	3.7	2
vehicle reliability	65.6	3	3.6	3
ranking seating	64.3	4	3.6	5
rank security personnel	60.8	5	3.6	6
seating density	60.8	6	3.5	8
service transfers	60.4	7	3.4	12
in-vehicle music	58.1	8	3.6	7
rank cleanliness	57.3	9	3.5	9
rank toilets	55.5	10	3.6	4
seat comfort	52.9	11	3.4	11
in-vehicle waiting	52.4	12	3.4	13
fare affordability	52.0	13	3.2	20
vehicle and rank livery	52.0	14	3.5	10
rank weather protection	51.5	15	3.3	17
taxi bunching	49.8	16	3.4	14
law compliance	49.3	17	3.3	18
journey time reliability	48.5	18	3.2	21
in-vehicle reading	47.1	19	3.4	15
rank staff customer care	44.5	20	3.3	16
rank security	42.7	21	3.1	22
in-vehicle staff customer care	42.3	22	3.3	19
rank passenger information	36.1	23	2.9	26
cash-based fares	35.2	24	2.9	28
vehicle cleanliness	33.0	25	3.1	23
in-vehicle security	29.5	26	2.9	27
in-vehicle temperatures	27.8	27	3.0	25
service availability	27.4	28	2.6	30
travel speed	27.3	29	2.5	31
passenger politeness	26.9	30	3.0	24
boarding and alighting	21.1	31	2.6	29

Appendix B. Service attribute percentage and mean importance ranking, by public transport mode (n=993)

Train	% important	rank	mean rating	rank
station security personnel	95.3	1	1.4	2
station passenger information	93.8	2	1.4	4
station security	93.1	3	1.4	5
vehicle reliability	92.8	4	1.4	1
in-vehicle security personnel	92.4	5	1.4	3
in-vehicle security	91.7	6	1.4	6
service punctuality	91.3	7	1.5	7
station weather protection	90.6	8	1.6	8
station cleanliness	89.8	9	1.7	10
in-vehicle overcrowding	87.7	10	1.7	11
boarding and alighting	87.3	11	1.7	13
fare affordability	86.2	12	1.7	9
service frequency	85.9	13	1.8	16
station staff customer care	85.9	14	1.7	12
vehicle cleanliness	85.8	15	1.8	14
ticket purchase	85.1	16	1.8	15
seat comfort	82.6	17	1.9	20
open doors	81.2	18	1.8	17
travel speed	80.4	19	1.9	19
seat availability	80.0	20	1.9	18
station seating	79.3	21	2.0	21
in-vehicle temperatures	72.9	22	2.1	23
station toilets	71.3	23	2.1	24
driver behaviour	70.9	24	2.1	25
in-vehicle staff customer care	69.7	25	2.1	22
vehicle and station livery	69.1	26	2.3	27
seating density	69.0	27	2.3	28
service transfers	64.9	28	2.2	26
passenger politeness	62.3	29	2.4	29
train bunching	53.6	30	2.4	30
graffiti	51.5	31	2.7	31
in-vehicle reading	43.6	32	3.0	32

Bus	% important	rank	mean rating	rank
bus stop weather protection	95.4	1	1.4	4
bus stop security	94.6	2	1.4	2
service punctuality	94.2	3	1.4	5
interchange security	93.8	4	1.4	3
interchange weather protection	93.3	5	1.5	11
in-vehicle security	93.3	6	1.4	6
vehicle reliability	92.1	7	1.4	1
seat comfort	91.7	8	1.6	16
driver behaviour	91.3	9	1.4	7
vehicle cleanliness	91.3	10	1.5	14
interchange seating	90.8	11	1.6	15
fare affordability	90.4	12	1.5	9
bus stop seating	90.0	13	1.6	17
interchange pax. information	90.0	14	1.5	10
in-vehicle overcrowding	89.6	15	1.6	19
seat availability	89.6	16	1.5	13
bus stop passenger information	88.8	17	1.5	8
interchange security personnel	88.8	18	1.5	12
bus stop cleanliness	87.9	19	1.6	18
interchange cleanliness	87.5	20	1.7	22
in-vehicle staff customer care	87.1	21	1.6	21
interchange staff customer care	86.7	22	1.6	20
service frequency	82.1	23	1.7	23
seating density	82.1	24	1.8	26
interchange toilets	82.1	25	1.8	25
boarding and alighting	80.4	26	1.9	28
ticket purchase	80.0	27	1.9	29
service transfers	79.2	28	1.8	27
in-vehicle temperatures	78.3	29	1.8	24
bus bunching	76.3	30	1.9	30
passenger politeness	75.8	31	2.0	32
travel speed	74.2	32	1.9	31
vehicle and stop livery	73.8	33	2.0	33
in-vehicle reading	60.5	34	2.3	34

Minibus-taxi	% important	rank	mean rating	rank
rank security	89.4	1	1.5	2
service availability	89.4	2	1.7	5
vehicle reliability	88.5	3	1.5	1
rank security personnel	88.1	4	1.6	3
driver behaviour	87.2	5	1.6	4
fare affordability	85.5	6	1.7	8
in-vehicle security	84.6	7	1.7	6
rank cleanliness	81.9	8	1.7	7
in-vehicle overcrowding	79.3	9	1.8	9
rank passenger information	79.3	10	1.8	10
seat comfort	78.4	11	1.9	11
rank weather protection	77.5	12	1.9	12
vehicle cleanliness	77.1	13	1.9	13
law compliance	72.7	15	2.0	14
rank staff customer care	72.7	14	2.0	15
ranking seating	71.4	16	2.0	17
travel speed	71.4	17	2.1	21
service transfers	70.9	18	2.0	16
seating density	70.5	19	2.1	19
journey time reliability	68.7	21	2.2	23
in-vehicle staff customer care	68.7	20	2.1	20
boarding and alighting	68.3	22	2.2	26
vehicle and rank livery	68.1	23	2.2	24
cash-based fares	67.8	24	2.1	22
rank toilets	67.0	25	2.0	18
in-vehicle music	66.5	26	2.2	27
in-vehicle waiting	65.2	27	2.2	25
in-vehicle temperatures	54.4	28	2.4	28
taxi bunching	50.2	29	2.5	29
passenger politeness	48.9	30	2.6	30
in-vehicle reading	48.0	31	2.7	31