MEASURING DISSATISFACTION WITH PUBLIC TRANSPORT SERVICE

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ABSTRACT

Measuring importance, perceived performance and satisfaction with public transport service is critical to identify priority areas for improvements. A dissatisfaction measure, witch combines measures of importance and performance labeled user disgruntlement (*1*), was used to ascertain the critical aspects of the service. The analysis was applied on different transport modes used for work and school trips and on two population sub-groups (e.g., women and men). Because attitudes as well as perceptions are important factors, insights into six previously extracted market segments using attitudes towards travel were also analyzed. The results showed that women as well as non-users of public transport seem to be more dissatisfied with service quality attributes. Key areas of improvement include aspects such as: transit cost, waiting time, on-time performance and frequency. With lower rankings of importance but also of great concern are aspects related to the level of crowding, having seats available, stops comfort and interchange.

Keywords:
Customer satisfaction, public transport service quality, market segmentation, travel attitudes, gender differences, transport modes.

INTRODUCTION

Measuring satisfaction with public transport and more important finding sources of dissatisfaction is critical to service providers in order to define priority areas of intervention. However, consumer evaluation of quality is an abstract and elusive concept to measure (*2*). It deals with abstract and intangible attributes, such as safety and comfort, which are not easily measured. Moreover, it is important to identify their relative importance to user's satisfaction and also to examine customer perceptions and expectations of service.

Different segments of user evaluate the same service quality area differently and their satisfaction may be influenced by different services attributes (*3*). As well, the needs and expectations of users may vary significantly between different segments of the market (*4, 5*). Furthermore improving public transport is not going to make car users in general to change from driving a car to using public transport, but service quality is perceived as an important determinant of users' travel demand (*6*).

Moreover travel behavior is influenced by attitudes towards using public transport and beliefs about whether or not public transportation can fulfill one's transport needs (*7*). This implies that traveler attitudes and preferences are an important component of travel behavior (*8-10*). Also demographic characteristics, such as gender can be important in explaining travel behavior. Women and men seem to exhibit differences in attitudes and preferences (*11*).

This means that when implementing marketing initiatives in order to promote alternatives to car use, the actual attractiveness of public transport has to be evaluated and potential aspects that cause dissatisfaction should be identified and prioritized.

This paper is a continuation of an ongoing study. In a previous study a factor analysis of attitudinal questions followed by a cluster analysis of the factors was performed. The cluster analysis uncovered six groups - Transit Enthusiasts, Anxious Status Seekers, Car-less Riders, Green Cruisers, Frugal Travelers, and Obstinate Drivers - with distinct attitudes, preferences and behaviors and different levels of propensity to use alternatives to the car (*5*). The current study focus on the analysis of importance and performance ratings of 20 transit service attributes, and derive a measure of dissatisfaction, named disgruntlement, with transit by cross-tabulating those two ratings, following a methodology propose by Stradling et al (*1*). Also since the previous study suggest that women and men exhibit some differences, gender differences are also going to be explored. Finally the same measure of dissatisfaction is going to be plotted for the six attitudinal clusters.

QUESTIONNAIRE DESIGN AND SAMPLE

The research instrument was developed based on a previous qualitative study and a literature review, which allowed to elicit the salient elements of service delivery. The qualitative study was based on in-depth interviews with regular and occasional users of public transport and car users and was conducted in the Porto region, Portugal (*12*).

The questionnaire comprised several sections. In the first section respondents were asked to rate the importance of the 20 attributes of transit service on a 0 (not important) to 10 (extremely important) scale. Then they rate the perceived performance of transit on the same attributes using a 0 to 10 agreement/ disagreement scale. The second section included 35 attitude questions measured on a Likert scale ranging from 0 (totally disagree) to 10 (totally agree).

Attitudinal questions included aspects related to time spent on traveling, attachment to the car, feelings towards public transport, travel stress, cost and environmental concerns. Questions regarding general information about the respondent travel behavior (focusing on the most regular trip), such as mode of transportation, reasons for the trip and frequency were also gathered. Additionally ratings on overall satisfaction with the transport used on regular trips were asked. The last section covered questions regarding socioeconomic information including age, gender, employment, education, income, occupation and household characteristics. The study focuses on the trip respondents undertake most regularly during the week, meaning the trip they do more often for the same purpose during a usual week.

Before the survey administration, pre-test of the questionnaire with a small group of respondents was conducted to check it adequacy.

The data was collected during the fall of 2005 (September-November). In all, 3009 telephone interviews were conducted by trained interviewers. The "nearest birthday method" was used to randomly select the member of the household older than 15 to complete the survey. The sample population consisted of individuals who reside in the Porto region, in Portugal. After screening the data 2812 usable responses were obtained. The response rate is 24.4%. In the cluster analysis some outlying observations were found so the final sample result in 2778 respondents.

Greater Porto is the second largest metropolitan area of Portugal, with about 1.5 million people. This urban area around Porto city includes fourteen municipalities in northern Portugal. In a 10-year period, from 1991 to 2001, car journeys to work or school increased from 31% to 52%, and public transport usage declined from 42% to 28% (*13*). Buses are the most used form of public transport. A new mode of transport, light rail, is being constructed in the metropolitan area. Light rail, which started its operation in 2003, offered only two lines at the time this study was carried out, but more are still under construction.

DATA DESCRIPTION

This discussion will begin with a short review of the sample descriptive information about demographics and travel patterns. It must be noted that when analyzing gender differences that female are overrepresented in the sample (68%) compared to Census data for the Porto Metropolitan Area population (52%). Therefore, descriptive statistics based on the sample as a whole will in general be biased, particularly those for variables correlated with gender. Also, the sample is on average relatively older than Porto Metropolitan Area population and consequently public transport users are overrepresented in the sample. The gender bias may be explained because older women tend to be more at home.

The sample comprised 49.5% of public transport users, 38.6% of private car users, 4.7% of both public and private transport users and 6.2% walk. The demographics of the sample indicate that 32 percent of the respondents were male and 68 percent of them were female. Respondents ranged in age from 16 to 79 years. Only 16 percent had completed undergraduate or postgraduate studies. Half of the respondents were employed (53.6%), and a further 8.9% were currently studying. More than seventy per cent reported monthly incomes of €1,000 or less, with women having lower incomes than men.

A higher percentage of men hold driver's license (84.2% of men and 56.7% of women), and own a car (76.9% of men and 49.8% of women).

Almost half of the respondents' most regularly trip was to commute to work (49.7% of men and 44.3% of women), which is consistent with men's high levels of employment found in Porto Metropolitan Area population (55% of men and 45% of women *(13)*.

As expected, some difference in travel patterns emerged. For non-work trips 61.5% of women use public transport, 25.4% travel by car and 8.2% walk. But for work trips women car usage increase to 45.2% and 42.2% use public transport. Men use car more, not only for work trips but also for other trips and also walk less than women. Sixty per cent of the men use car for non-work trips and 27.7% use public transport and only 4.4% walk. For work trips men use mainly car (65.0%), only 24.3% commute by public transport and 2.9% walk. It is interesting to note that for school trips, young men also use more car than young women (38.1% of men and 28.6% of women). Women make more short trips than men (less tan 15 minutes) and longer trips (more than 45 minutes). The analysis of the trips length by mode of transport reveals that women's trips by car are shorter than men's, also women make more short walking trips.

KEY SERVICE ATTRIBUTES: IMPORTANCE, PERFORMANCE AND DISGRUNTLEMENT

Dissatisfaction for journeys to work or school

The type of journey influences the importance given to some of the attributes, although the ranking pattern of most of the attributes importance is quite similar. As expected for work and school trips attributes related to hours of service, interchange, reliability, cost and frequency are rated higher, on the other hand, ratings on the drivers look and availability of seats are less important.

The analysis of performance ratings by type of journey revealed that all attributes for work and school trips have considerable lower ratings, especially on the aspects related to cost, rapidity, reliability, frequency, comfort, seats availability and level of crowding. The subsequent analysis focuses on trips to work or school resulting in a subsample of 1526 participants.

Table 1 shows the importance ratings for the 20 attributes, ordered from highest to lowest mean rated importance for trips to work or school. All 20 attributes were rated as important or very important by 82% or more of the sample. It is interesting to note that the importance ranking pattern is quite similar for all respondents independently of transport mode used. Ride safety, on-time performance, frequency, vehicle cleanliness and waiting time received the highest ratings. On the other hand items like having air conditioning on board, the drivers look, and having seats available are less important. Interestingly, both transit users and car users rated importance quite similarly.

The performance ratings ordered from worst (lowest percent agreeing the attribute is being performed well) to best (highest percent) by mode of transport is shown in Table 2. As with importance the performance ratings pattern is quite similar for all modes of transport. This implies that all respondents either using or not transit evaluate transit performance in a similar way. Car users perceived that transit performance is worst than all others travelers, consistent with findings from previous studies (12, 14, 15). People who never use buses or have only used them many years ago have a very negative image of the service. This may be due to their lack of actual knowledge about transit service and how much they have improved since they have last used them. The largest gaps in performance ratings between transit users and car users are found

TABLE 1 Importance ratings (%) of the 20 attributes: % very + % important

'When I use transit it is important that…'	Transit N=887	Car N=748	Transit and Car N=77	Walk N=84	Total N=1526
The ride is smooth and safe	98	97	99	99	98
The services are on time	97	97	100	98	97
The services are frequent	97	97	100	96	97
The vehicles interior are clean	97	97	99	96	97
Waiting time is short	97	97	99	96	97
Buying tickets is easy	98	95	99	96	96
The vehicles are comfortable	97	95	97	96	96
Travel time is fast	96	95	97	96	96
The price is affordable	95	96	99	94	96
The information is clear	96	95	97	99	96
The shelters/stops are comfortable	95	96	95	98	96
The drivers are helpful and courteous	95	94	97	96	95
Getting information is easy	94	94	97	95	94
Changing vehicles is easy and fast	94	94	96	96	94
The vehicles are not over crowded	93	93	97	95	93
The hours of services are extended	90	90	92	87	90
The walking to shelters/stops is short	89	90	95	87	90
The vehicles have air conditioning	87	85	91	82	86
The drivers look nice and clean	87	84	92	82	86
Seats are always available on the vehicle	84	84	90	87	84

TABLE 2 Service performance ratings (%) of the 20 attributes: % strongly agree + % agree

'I think that transit…'	Transit N=887	Car N=748	Transit and Car N=77	Walk N=84	Total N=1526
The price is affordable	33	28	27	26	30
Seats are always available on the vehicle	34	30	31	38	33
The vehicles are not over crowded	38	33	27	38	35
Waiting time is short	46	40	52	51	44
The shelters/stops are comfortable	46	42	53	54	45
The services are on time	48	43	60	55	46
Changing vehicles is easy and fast	52	45	65	51	49
The services are frequent	54	52	66	58	54
Travel time is fast	57	50	64	65	54
The vehicles have air conditioning	58	54	64	55	56
The hours of services are extended	60	53	53	64	57
Getting information is easy	65	57	73	60	61
The information is clear	64	58	74	60	61
The drivers are helpful and courteous	66	61	66	74	64
The walking to shelters/stops is short	68	61	68	67	64
The vehicles are comfortable	71	64	70	69	67
The vehicles interior are clean	74	66	74	73	70
The ride is smooth and safe	72	68	81	76	71
Buying tickets is easy	77	66	73	70	71
The drivers look nice and clean	76	74	77	81	75

on attributes related to using transit (buying tickets, getting information, changing vehicles, and services hours), time (walking to shelters/stops, travel time) and comfort (vehicles interior cleanliness and comfort).

Is important to know how many respondents think a particular service attribute is both important and poorly performed. Travelers with such a discrepancy in their individual ratings are likely to be disgruntled (1).

The disgruntlement measure was computed by cross-tabulating performance (respondents who strongly disagree and disagree) against importance scores (respondents rating important and very important) for each attribute.

This measure can assist in prioritizing areas for dissatisfaction reduction by setting the level of disgruntlement with a service aspect with respect to its level of perceived importance. The plot is then divided into 4 zones around the centroid of data, with differing action implications for the items falling within each zone.

Zone 1 includes service aspects with high importance and high disgruntlement being top priority and in need of urgent action. Zone 2 elements of service are of high importance but low disgruntlement and should be monitored to ensure low levels of dissatisfaction. Zone 3 includes the low importance and low disgruntlement elements. The possibility of redeploying resources currently being used on Zone 3 to improve Zone 1 urgent elements of service may be considered. Zone 4 aspects of service induce high disgruntlement but (relatively) low importance. Service elements falling on this Zone should be delayed until Zone 1 satisfaction has been improved (1).

Table 3 gives the 20 service attributes in decreasing order of disgruntled respondents. A higher percent of car users are more dissatisfied with transit than transit users on almost all service elements.

TABLE 3 Disgruntlement measures (%) for the 20 attributes: % Disgruntled respondents

	Transit	Car	Transit and Car	Walk	Total
	N=887	N=748	N=77	N=84	N=1526
The price is affordable	43	49	52	51	47
The vehicles are not over crowded	36	40	42	33	38
Seats are always available on the vehicle	36	37	34	31	36
Waiting time is short	33	34	35	30	33
The shelters/stops are comfortable	31	35	32	30	33
The services are on time	32	35	23	29	33
Changing vehicles is easy and fast	23	30	14	27	26
The services are frequent	27	26	26	26	26
Travel time is fast	21	27	22	11	23
The hours of services are extended	18	24	26	21	21
Getting information is easy	16	22	17	18	19
The information is clear	17	21	12	15	18
The vehicles have air conditioning	15	18	14	20	17
The walking to shelters/stops is short	13	20	12	15	16
Buying tickets is easy	12	19	16	15	16
The vehicles interior are clean	13	12	18	12	13
The vehicles are comfortable	12	14	14	12	13
The drivers are helpful and courteous	11	12	12	8	11
The ride is smooth and safe	10	13	5	4	11
The drivers look nice and clean	6	5	5	4	5

The ranking order obtained in Table 3 is quite similar to the obtained in performance ratings (Table 2). This implies that respondents' most important attributes for journeys to work or school are actually the ones with worst performances. The advantage of this measure is that it allows to identity how many respondents exhibit a gap between actual and ideal service on each service attribute (1).

Gender Differences

To ascertain if any gender differences in importance and performance ratings for each attribute show up, the ratings were calculated for women and men (see Figure 1 and 2).

Figure 1 gives women and men importance ratings for the 20 attributes. Women place a higher importance than men do on all service attributes, but both genders tend to rank the attributes in the same manner.

FIGURE 1 Percent of men and women rating attributes as important or very important.

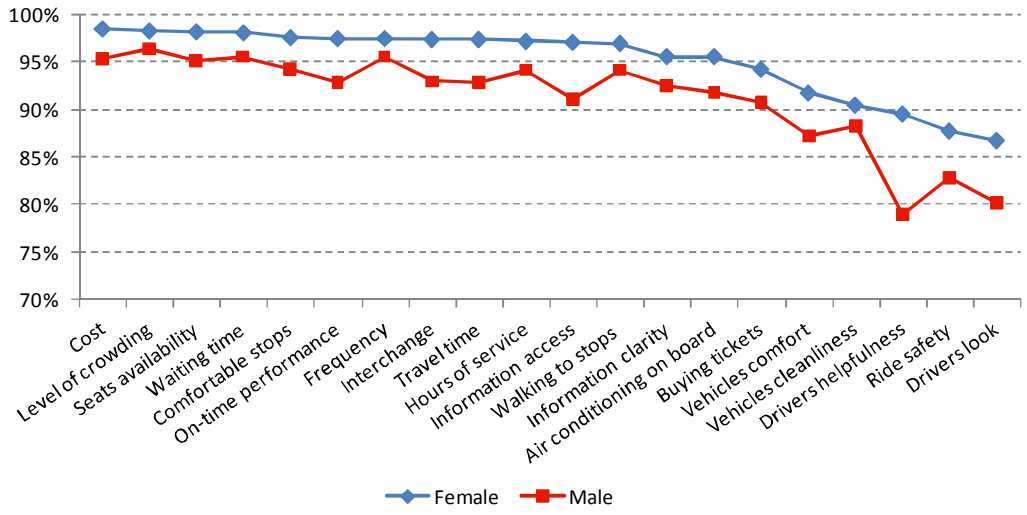
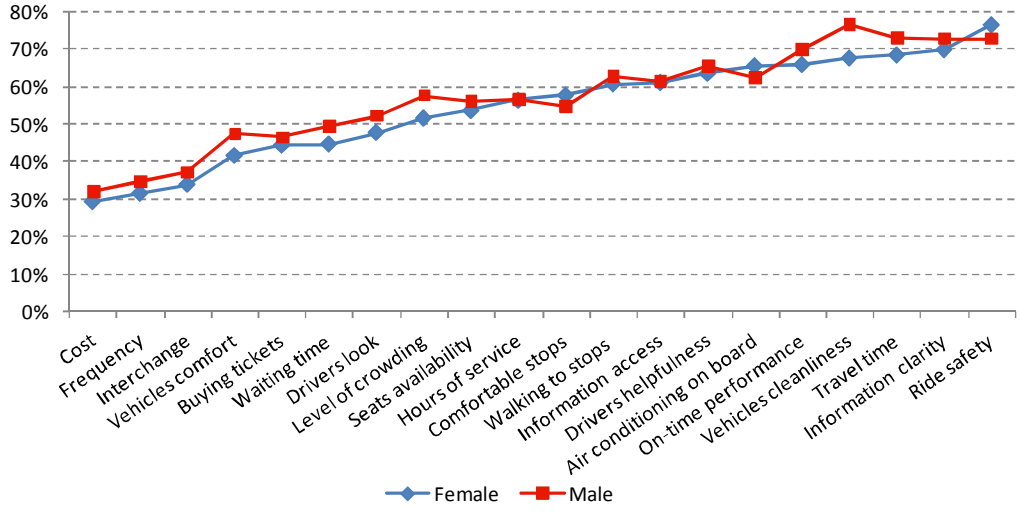


FIGURE 2 Percent of men and women agreeing or strongly agreeing that transit performed well on each attribute.



Women rated the performance of almost all attributes worst than men (Figure 2). The gap in performance ratings is largest on attributes related to comfort (vehicles cleanliness, level of crowding and vehicles comfort) and time (waiting time and travel time and on-time performance).

It is important to identify which aspects of the service induce higher dissatisfaction and consequently must be prioritized implicating different actions. The disgruntlement measure was plotted against importance and four action zones around the centroid of data were defined.

Figure 3 and 4 show the plots of disgruntlement against importance for women and men for trips to work or school. Women are more dissatisfied with almost all service attributes (it should be noted that the sample has a higher percentage of women). But the items falling in Zone 1, the top priority area (high disgruntlement + high importance), are the same, indicating that the gap between actual and ideal service is similar to both genders, although it seems to be larger for women. This is consistent with a previous part of this study which analyzed attitudes towards travel and found that man expressed more positive attitudes towards public transport than women (5).

FIGURE 3 Scatter graph of disgruntlement vs. importance for female respondents.

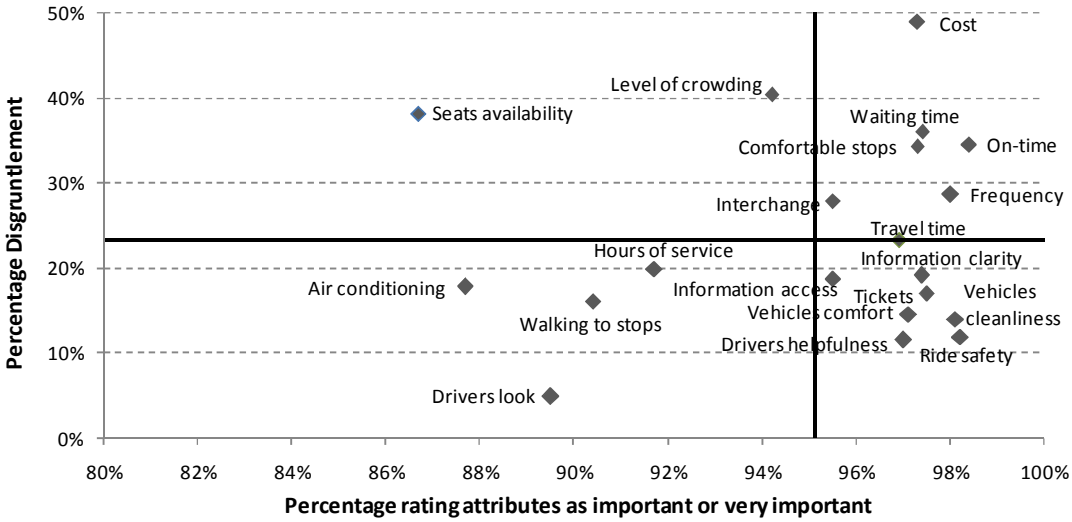
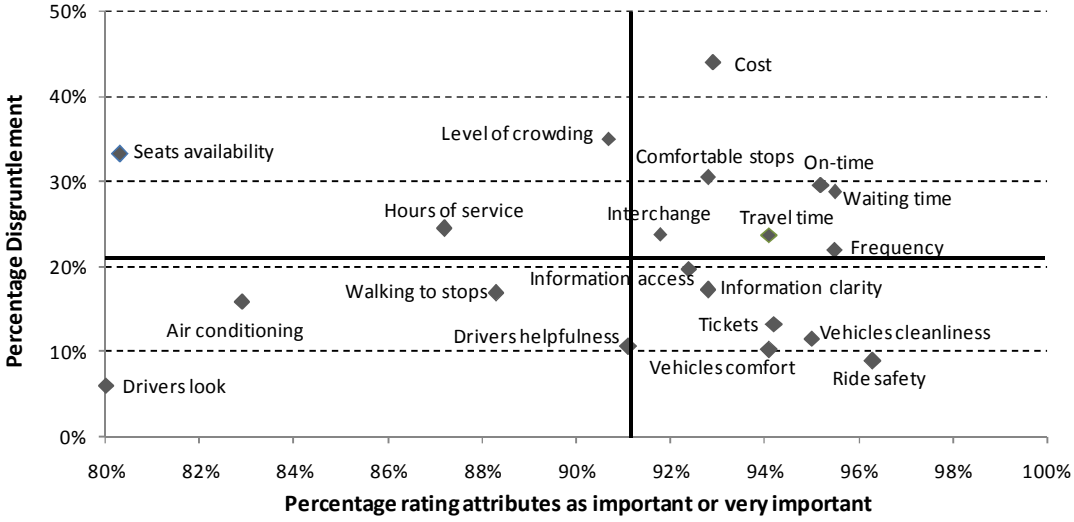


FIGURE 4 Scatter graph of disgruntlement vs. importance for male respondents.



Plots of dissatisfaction for the six attitudinal segments

Table 4 shows the key characteristics of the six cluster uncovered in a previous research, which allow a better knowledge of each attitudinal segment profile.

TABLE 4 Summary of key characteristics of the clusters profiles

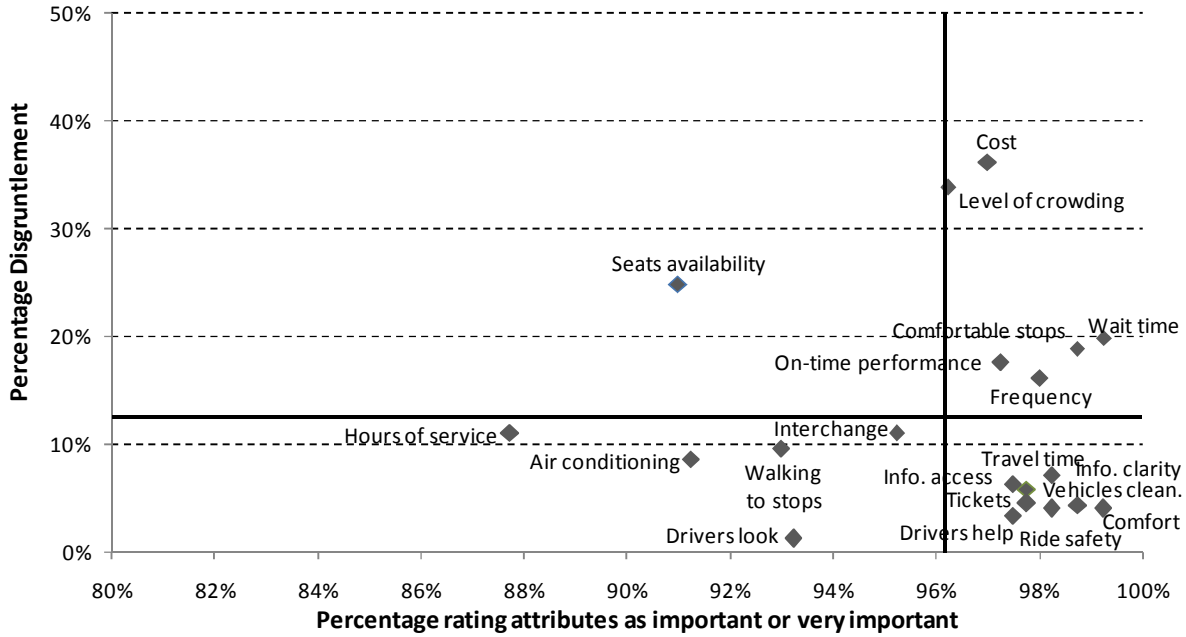
Demographics	Travel Behavior	Attitudes	Satisfaction and intention to use transit
Cluster 1 :Transit Enthusiasts			
• 74% women • older people • low income • medium educational level	• 70% use transit • 36% trips to work/school • 55% diver license • 0.6 vehicle availability	• High favorable attitude towards public transport • Low desire to change their form of transportation • Transport cost it is not important	• Highly satisfied with public transport usage • High intention to use more public transport
Cluster 2: Green Cruisers			
• 68% women • middle age people • median income • median educational level	• 34% use transit • 61% trips to work/school • 86% diver license • 0.7 vehicle availability	• High environmental awareness • High favorable attitude towards public transport	• Very satisfied with public transport usage • High intention to use more public transport
Cluster 3: Car-less Riders			
• 79% women • older people • low income • low educational level	• 83% use transit • 28% trips to work/school • 21% diver license • 0.4 vehicle availability	• No car dependency • No need for control	• Very satisfied with public transport usage • Some intention to use more public transport
Cluster 4: Anxious Status Seekers			
• 66% women • older people • medium income • low educational level	• 47% use transit • 38% trips to work/school • 67% diver license • 0.7 vehicle availability	• Seek social status • Sensible to travel stress • Car dependency • Desire to change their form of transportation • Environmental concerns	• Very satisfied with public transport usage • High intention to use more public transport
Cluster 5: Frugal Travelers			
• 57% women • younger and older people • low income • median educational level	• 65% use transit • 44% trips to work/school • 58% diver license • 0.6 vehicle availability	• Very cost conscious • Not stressed by traveling • No desire to help the environment	• quite satisfied with public transport usage • some intention to use more public transport
Cluster 6: Obstinate Drivers			
• 66% women • middle age people • high income • high educational level	• 8% use transit • 90% trips to work/school • 55% diver license • 0.8 vehicle availability	• High psychological car dependency • High need for control • Very low attitude towards public transport • No desire to help the environment • Transport cost it is not important	• quite satisfied with public transport usage • low intention to use more public transport

Figures 5-10 shows the plot for the six clusters - Transit Enthusiasts, Green Cruisers, Car-less Riders, Anxious Status Seekers, Frugal Travelers, and Obstinate Drivers. It is interesting to note that the item with the highest percent of dissatisfaction for all clusters is transit cost. Moreover the cluster *Obstinate Drivers* who use mostly car and are not concerned with travel costs has the higher dissatisfaction with these aspect. Also, three items fall in all plots priority Zone 1 – waiting time, on-time performance, and frequency – indicating that time and reliability are major sources of dissatisfaction (though not equal level) with public transport for every traveler independently of attitudes or demographics characteristics.

The clusters profiling revealed that the *Transit Enthusiasts* and *Green Cruisers* are very satisfied with public transport and demonstrate a very high intention to use more public transport, which is consistent with their positive attitude towards public transport. So these two groups should be deeply analyzed to uncover critical sources of dissatisfaction.

Figure 5 shows the plot for the *Transit Enthusiasts*. Critical aspects include comfort – level of crowding, comfortable stops and seats availability – as well as the ones related to time and reliability.

FIGURE 5 Scatter graph of disgruntlement vs. importance for cluster *Transit Enthusiasts.*



Comparing this plot with the *Green Cruisers* (Figure 6) allows to see that cost is of much greater concern to these segment and that although level of crowding and seats availability causes disgruntlement these aspects have less importance to this group. Changing vehicles is also critical to this group.

Figure 7 shows the plot for cluster *Car-less Riders*, which is the group with high percent of women, transit usage and their trip purpose is mostly leisure, shopping or personal issues. Again aspects related to cost, travel time, reliability and comfort are of most concern as well as interchange.

FIGURE 6 Scatter graph of disgruntlement vs. importance for cluster *Green Cruisers.*

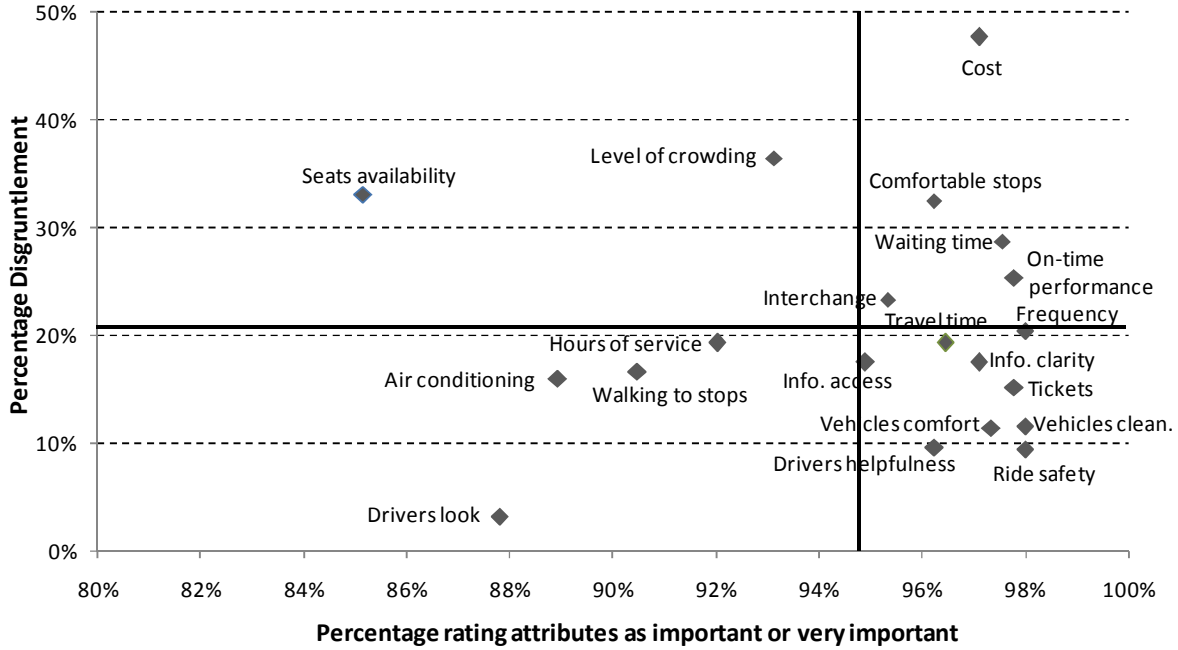
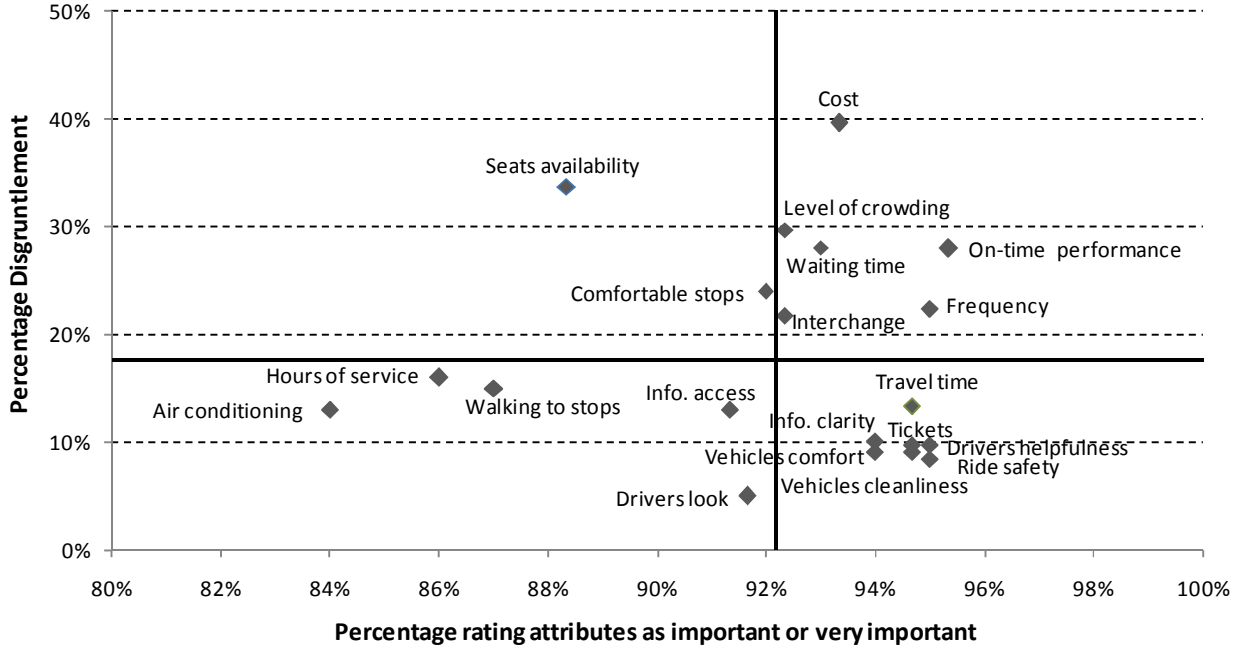


FIGURE 7 Scatter graph of disgruntlement vs. importance for cluster *Car-less Riders.*



The cluster *Anxious Status Seekers* plot is shown in Figure 8. This group is sensitive to travel stress but have a positive attitude towards public transport. So, besides cost and time and reliability, aspects related to comfort like, level of crowding, seats availability and comfortable stops were of concern.

FIGURE 8 Scatter graph of disgruntlement vs. importance for cluster *Anxious Status Seekers.*

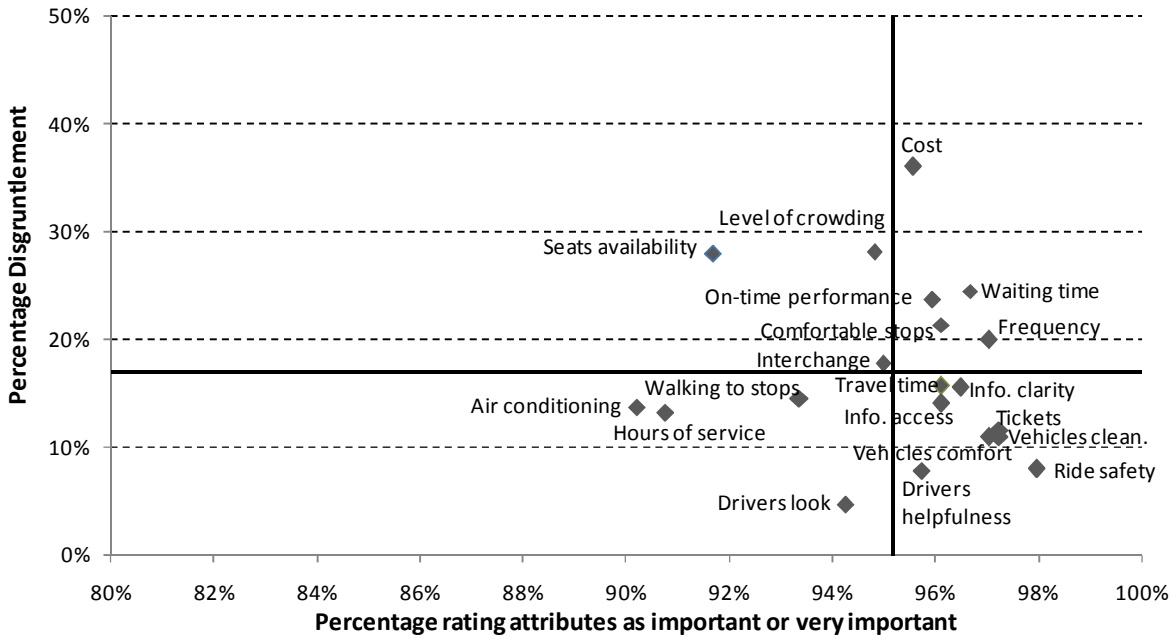


Figure 9 gives the plot for the *Frugal Travelers*. This group has a high rate of public transport usage, but they are not very satisfied with the service quality and dislikes public transport. Consistently they have an average high level of disgruntlement and cost is of much concern.

FIGURE 9 Scatter graph of disgruntlement vs. importance for cluster *Frugal Travelers.*

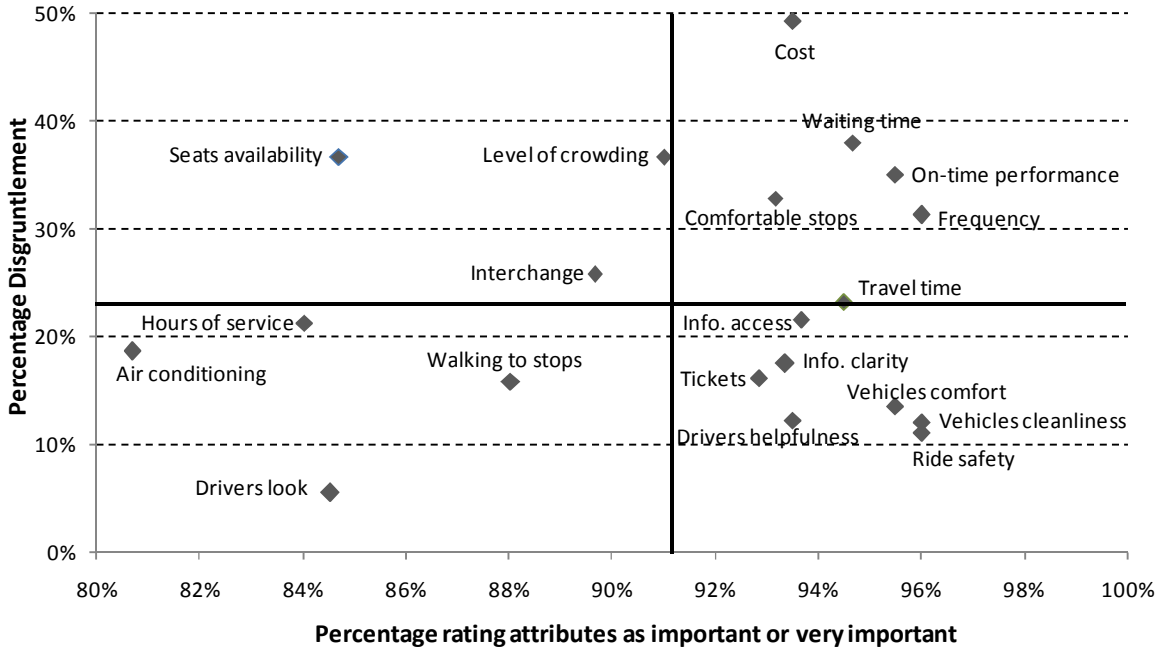
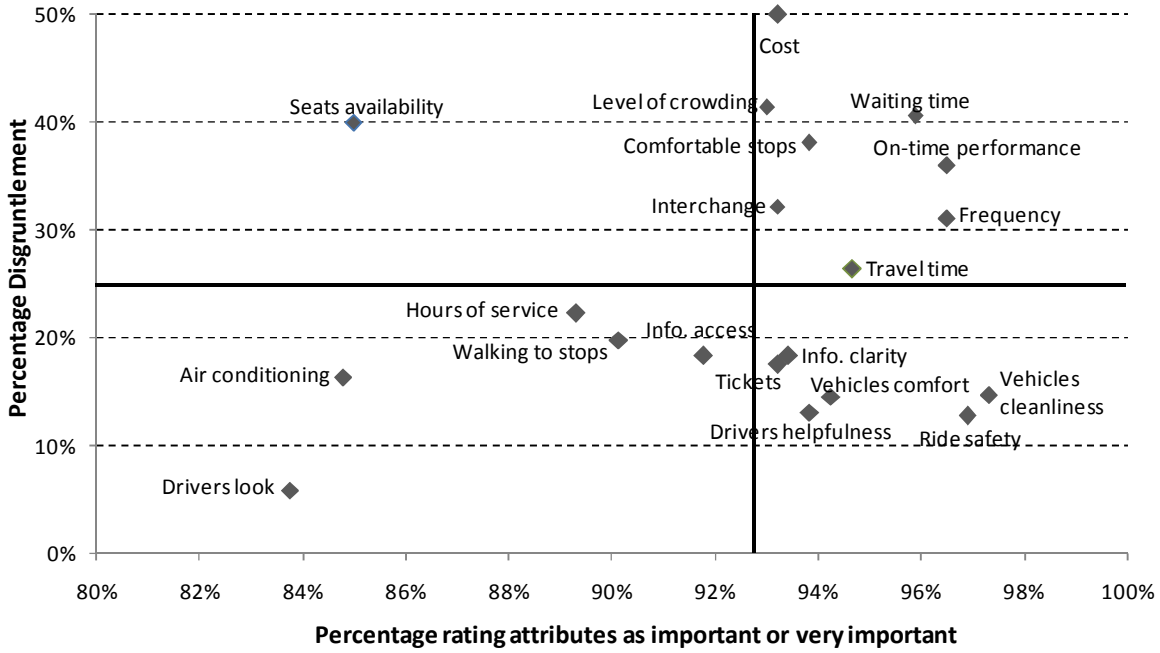


Figure 10 shows the plot for the *Obstinate Drivers*. This group has an average higher level of disgruntlement, perhaps because they use mostly car, and have a strong negative feeling towards public transport so their perception of transit performance is not accurate.

FIGURE 10 Scatter graph of disgruntlement vs. importance for cluster *Obstinate Drivers*.



CONCLUSIONS AND IMPLICATIONS

From a service provider perspective it is essential to know which aspects of the service are most important and cause more dissatisfaction for the different types of users and potential users. The methodology used allows to identify the gaps between the actual and ideal service on each attribute.

This study pointed out the areas that should be considered priority, such as: transit cost, waiting time, on-time performance and frequency. With lower rankings of importance but also of great concern are aspects related to the level of crowding, having seats available, stops comfort and interchange.

It is interesting to note that for respondents using different modes of transportation, and for the attitudinal segments as well, the aspects that cause higher dissatisfaction are almost the same (thought in different levels). One element – transit cost – is always the aspect with highest dissatisfaction, even for the cluster with low sensitivity to travel costs and with high transport usage. This is probably because many car users tend to underestimate the cost of car travel and only considered fuel and parking costs.

From a gender perspective, women are more dissatisfied with almost all service attributes. But the items falling in the top priority area are the same, indicating that the gap between actual and ideal service is similar for both genders, although it seems to be larger for women.

The results also showed that car users displayed lowers perceptions of public transport performance than current users. Also the clusters with high car usage and with poor image of public transport exhibited on average the highest level of dissatisfaction. This may be due to lack of knowledge about public transport performance, but mainly due to psychological attachment to the car. It is well known that the car gives a sense of freedom, power, independence and control (*16*).

This has important implications for transport initiatives targeting travel behavior change and promoting alternatives to car use. It is essential for public transport operators to promote a positive public perception of their services. This requires an understanding of how consumers' perceived the service being offered, which aspects are more important and the major sources of dissatisfaction for the segments most motivated to change.

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