PASSENGER SATISFACTION WITH MINIBUS-TAXI FEEDER SERVICES AT THE MITCHELLS PLAIN PUBLIC TRANSPORT INTERCHANGE IN CAPE TOWN

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ABSTRACT

The replacement of unscheduled minibus-taxi services with scheduled BRT trunk-feeder networks in South African cities, as envisioned in the 2007 Public Transport Strategy, has proven difficult to achieve. Consequently, in Cape Town, the city authority is proposing a hybrid network, comprised of scheduled trunk services and unscheduled minibus-taxi feeder/distributor services, as a more feasible public transport reform. The Mitchells Plain public transport interchange in Cape Town includes three minibus-taxi ranks in close proximity to a rail station and two large bus termini. The minibus-taxi associations linked to these ranks offer unscheduled feeder/distributor services that mirror the trunk-feeder service integration envisaged in the hybrid network model. The aim of this paper is: to explore levels of satisfaction amongst passengers using these unscheduled feeder/distributor services; and to identity the attributes of these services that require priority improvement in the pursuit of a complementary hybrid service network. The method of analysis takes the form of a modification of the 'quadrant model', which plots service attribute satisfaction against importance, in order to identify priorities for service quality improvement. Analysis of (n=616) survey data indicates that, amongst transferring passengers, service attributes with highest importance and lowest satisfaction include: driver compliance; vehicle overloading; vehicle comfort; vehicle safety; and driver customer care. This analysis also suggests that the most satisfactory and important service attributes amongst transferring passengers include: service route proximity and flexibility; trip time; rank weather protection; morning service availability; and rank staff friendliness. The findings suggest that, apart from rank security, transferring passengers are relatively satisfied with the 'hybrid' trunk-feeder service integration.

1. INTRODUCTION

The replacement of unscheduled minibus-taxi (MBT) services with Bus Rapid Transit (BRT) trunk-feeder networks in South African cities, as envisioned in the Public Transport Strategy (DoT 2007), has proven expensive and problematic (Behrens and Salazar Ferro 2016, HvR 2014, Von der Heyden *et al* 2015). Consequently, the City of Cape Town has recognised the need for a 'hybrid network', comprised of complementary scheduled trunk services and unscheduled MBT feeder/distributor services (CoCT 2015). This shift from 'replacement' to 'hybridity' necessitates policy attention be given to improving MBT quality of service as part of the public transport reform effort. Understanding passenger satisfaction with MBT services will be important in identifying priority improvements.

The Mitchells Plain public transport interchange in Cape Town represents a useful case study, as it has MBT associations that exclusively provide unscheduled feeder/distributor services for trunk passengers. Earlier research on the case has focussed on the supply-side, particularly: service span and headway operations (Behrens *et al* 2017); and driver willingness to accept operational changes (Plano *et al* 2018). To date passengers have not been interviewed (beyond a short intercept survey of mode transfer, Birungi 2017).

Prior studies of MBT passenger perceptions of quality of service in Cape Town, and elsewhere in South Africa, have consistently found higher levels of dissatisfaction relative to conventional bus services (Behrens and Schalekamp 2010, DoT 2005; Govender 2014, Stats SA 2014, Vilakazi and Govender 2014). This raises the question whether passengers perceive MBT feeder service quality to be the same as that of the broader MBT service network, and whether there is a basis to expect that passengers will not be satisfied with the envisaged hybrid network.

The aim of this paper is therefore to explore levels of satisfaction amongst passengers using unscheduled feeder/distributor services in Mitchells Plain; and to identity the attributes of these services that require priority improvement in the pursuit of a complementary hybrid service network.

The paper is divided into five sections. The next section describes the case study context and the survey method. Section 3 reports on research findings. Section 4 compares the results with similar public transport satisfaction surveys in Cape Town. Section 5 concludes with discussion on policy implications.

2. RESEARCH METHOD

The research draws from three linked projects that collected satisfaction data from passengers at the three minibus-taxi ranks in the Mitchells Plain public transport interchange (Dodgen 2017, Fusire 2017 and Mukhuba 2017). This section describes the case study context, and explains the survey method applied in the three projects.

2.1 Case study context

The study area is located to the west and east of the Mitchells Plain public transport interchange, which is located some 27 kilometres south-east of the Cape Town city centre. The absence of large-scale employment opportunities in the area necessitates that a large portion of the working population commute considerable distances on a daily basis. Approximately 75 000 passengers move through the interchange each weekday. According to the 2011 national census, the study area is approximately 22 square kilometres in extent, and has a residential population in the region of 236 000.

The interchange is comprised of a rail station, termini for Golden Arrow and MyCiTi line-haul bus services, and three MBT ranks to the north, south and west of the rail station (see figure 1). Passengers from three MBT associations based at the interchange were surveyed: Hazeldene Shuttle Services (HSS) operating out of the western rank; Beacon Valley Taxi Association (BVTA) operating out of the northern rank; and 7th Avenue Taxi Association (7ATA) operating out of the southern rank.

Figure 1. ***Mitchells Plain public transport interchange***

Figure 2 maps the six minibus-taxi service routes operated by the three associations. These routes serve a catchment area for the train and line-haul bus and MBT services that operate from the public transport interchange. As revealed by earlier analysis of vehicle boarding and alighting data (Behrens *et al* 2017), there is frequently real-time route deviation in response to on-board passenger requests. Cash fares range between R7.00 and R10.00.

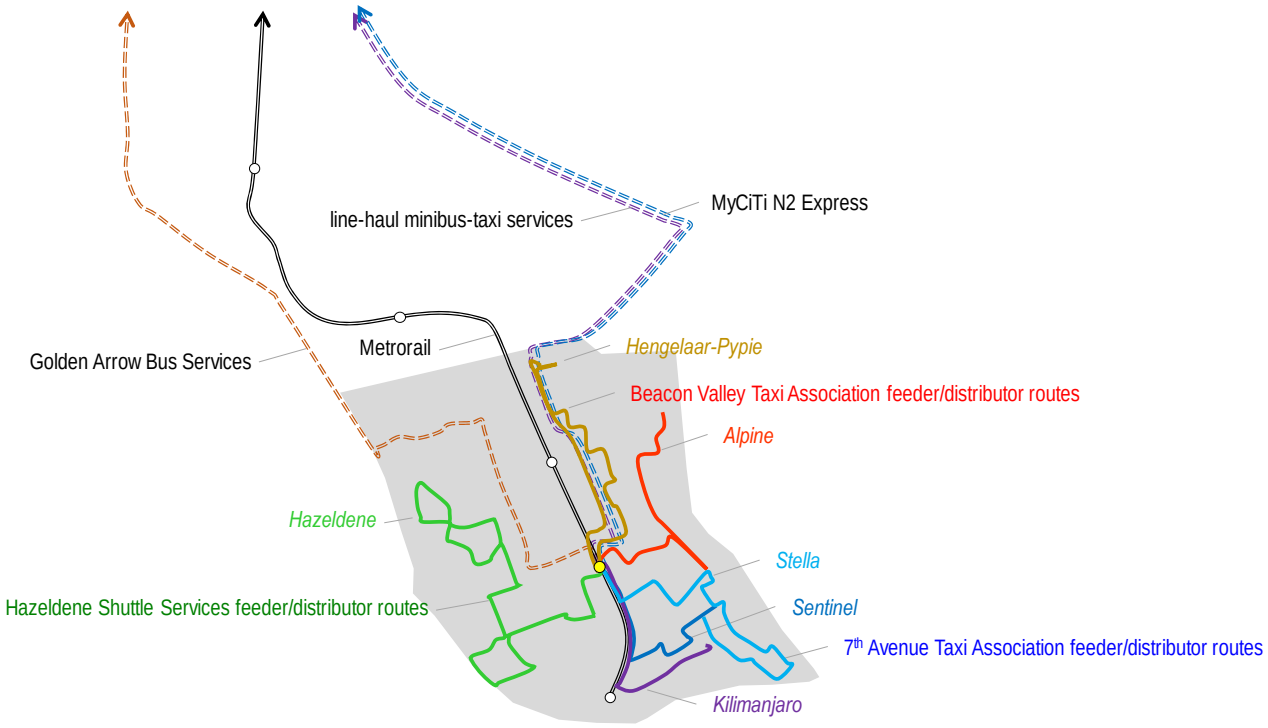


Figure 2. ***Map of feeder routes studied***

2.2 Data collection

Instrument design began with discussions with members of the three MBT associations to verify a list of service attributes for inclusion in a short passenger intercept questionnaire. The first part of the questionnaire asked questions relating to respondent sex, age, car access, mode transfer, and time and frequency of use. The second part asked for Likert satisfaction ratings (from 'strongly agree', 'agree', 'neutral/uncertain', 'disagree' to 'strongly disagree') in relation to 29 (positively phrased) service attribute statements. Following satisfaction rating, respondents were asked to indicate the importance they attached to the service attribute (from 'very unimportant',' unimportant', 'neutral/uncertain', 'important' to 'very important'). The questionnaire underwent pilot tests which served to identify the best location and time for productive data collection.

Seven interviewers were used in the survey. Interviewers were instructed to randomly intercept passengers either waiting at rank platforms or sitting in stacked vehicles, on weekdays. Most data collection occurred in the morning off-peak (between 09h00 and 13h00). Rank marshals (or 'linesman') were notified of when data collection would occur, and asked to facilitate access to passengers and to ensure no disruption from vehicle crews. HSS data were collected between 11 July and 14 August 2017. BVTA and 7ATA data were collected between 25 October and 9 November 2017.

Table 1 presents the survey sample. A total sample of 616 respondents was achieved, evenly distributed across the three MBT associations. Margin of error estimates range between 6.62% and 6.77%. The number of respondents per service route ranged between 65 and 200. There was an uneven distribution of respondents across sex (38% male vs. 62% female). Sixty-one percent of respondents transferred from, or to, another public transport mode at the interchange.

Table 1. ***Survey sample characteristics***

	HSS	BVTA		7ATA				
		Alpine	Hengelaar-Pypie	Kilimanjaro	Sentinel	Stella	total	
no transfer	136	44	14	19	15	12	240	*39%*
mode transfer	64	97	51	48	60	56	376	*61%*
female	119	90	45	39	45	46	384	*62%*
male	81	51	20	28	30	22	232	*38%*
route	200	141	65	67	75	68		
	32%	*23%*	*11%*	*11%*	*12%*	*11%*		
total	200		206			210	616	
	32%		*33%*			*34%*		
catchment population	77 000		69 000			90 000	236 000	
users (est.[1])	4 250		3 850			5 000	13 100	
margin of error (est.[2]) (95% confidence level)	6.77%		6.64%			6.62%		

Notes:

1. Each catchment area's population, from the 2011 Census, was divided by mean household size to estimate the number of households. Mean household trip rates from the City of Cape Town's 2013 household travel survey were applied to estimate the total number of passenger trips per day. Mode share and mode transfer data were used to estimate the number of (single and multiple mode) trips by MBT. It was assumed the average user makes two MBT trips a day, resulting in an estimation of the number of individual users in each catchment area.
2. Qualitative data from drivers and vehicle owners in focus group discussions indicated that there has been considerable change in mode use patterns in recent years, particularly with respect to train transfers, so these margins of error estimates should be viewed as crude and indicative.

Apart from margins of error greater than 5%, the data have two main limitations. The first relates to the time of data collection. Post-peak morning interviews are likely to have introduced sampling bias: it is less likely that passengers requiring evening services were intercepted, which limited the reliability of the satisfaction and importance ratings of attributes relating to evening services. The second relates to sex. The sex imbalance may have skewed results, as Behrens and Schalekamp 2010 found that females tend to rate some attributes (particularly related to safety and comfort) as more important than males.

2.3 Data analysis

Following data collection, questionnaire responses were coded into a flat-line database. The main form of data analysis was the filtered tabulation of satisfaction and importance ratings, and the ranking of service attributes on the basis of mean scores.

The conventional approach to Importance-Performance Analysis (IPA), also referred to as the 'quadrant model', plots service attribute satisfaction and importance scores into quadrants delineated on the basis of a data centroid (see figure 3a). This technique, attributed to Martilla and James (1977) in the field of market research, labels the four quadrants: 'possible overkill'; 'low priority'; 'keep up the good work'; and 'concentrate here'. The 'concentrate here' quadrant clusters service attributes rated as both highest in importance and most dissatisfactory. This technique enables an identification of those attributes that are either most in need of improvement, or conversely, candidates for possible cost-saving measures. The simplicity of the quadrant model in application and interpretation has led to its widespread use in a variety of fields, including the manuals issued by the US Transportation Research Board on how to measure public transport passenger satisfaction and service quality (TRB 1999 2004).

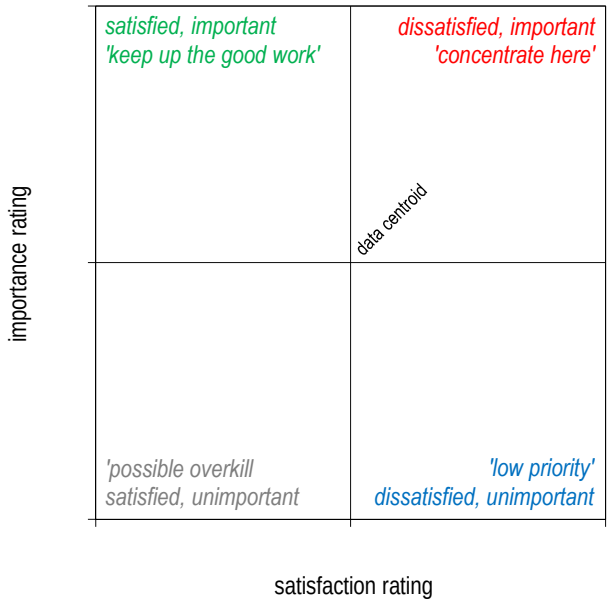


Figure 3a. ***Conventional quadrant model***

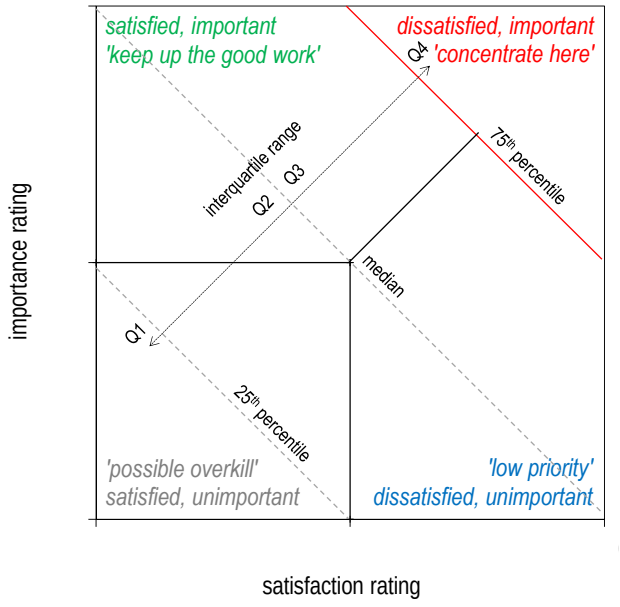


Figure 3b. ***Diagonal quadrant model***

The quadrant model has, however, been subjected to critique. The main criticism relates to arbitrariness in the priorities inferred from the plot (Bacon 2003, Behrens and Schalekamp 2011, TRB 1999). A slight change in a service attribute's plot position might lead to a dramatic change in its inferred priority. A good example of this can be found in Beirão and Cabral (2010:10), where the second ranked dissatisfactory service attribute ('level of crowding') falls just outside the 'concentrate here' quadrant because its importance value falls just below the mean. In response to this criticism, 'diagonal quadrant models' have been proposed (Abalo 2007, Bacon 2003). In essence, it is argued that for the purposes of service attribute prioritisation, the iso-priority line runs perpendicular to the diagonal connecting the 'concentrate here' quadrant (i.e. dissatisfied important) and the 'possible overkill' quadrant (i.e. satisfied unimportant).

The technique applied in this study is a modification of the diagonal quadrant model (see figure 3b). The quadrants are delineated using a plot of median and 75th percentile centroids. Service attribute plots are therefore located within both a priority quadrant and an interquartile range.

3. RESEARCH FINDINGS

Research findings are discussed in terms of the satisfaction, importance and priority of service attributes, initially amongst all passengers in the sample, and then amongst only passengers who transferred to another public transport mode at the interchange.

3.1 All passengers

When analysing all passengers on all service routes, a general finding is that, with the exception of one attribute (vehicle overloading) on one service route (Alpine), all routes received positive mean attribute ratings (i.e. located in the 'satisfied important' quadrant: see the conventional quadrant scale-centred plot in figure 4). Passengers therefore appear to be largely satisfied with the feeder/distributor services on offer.

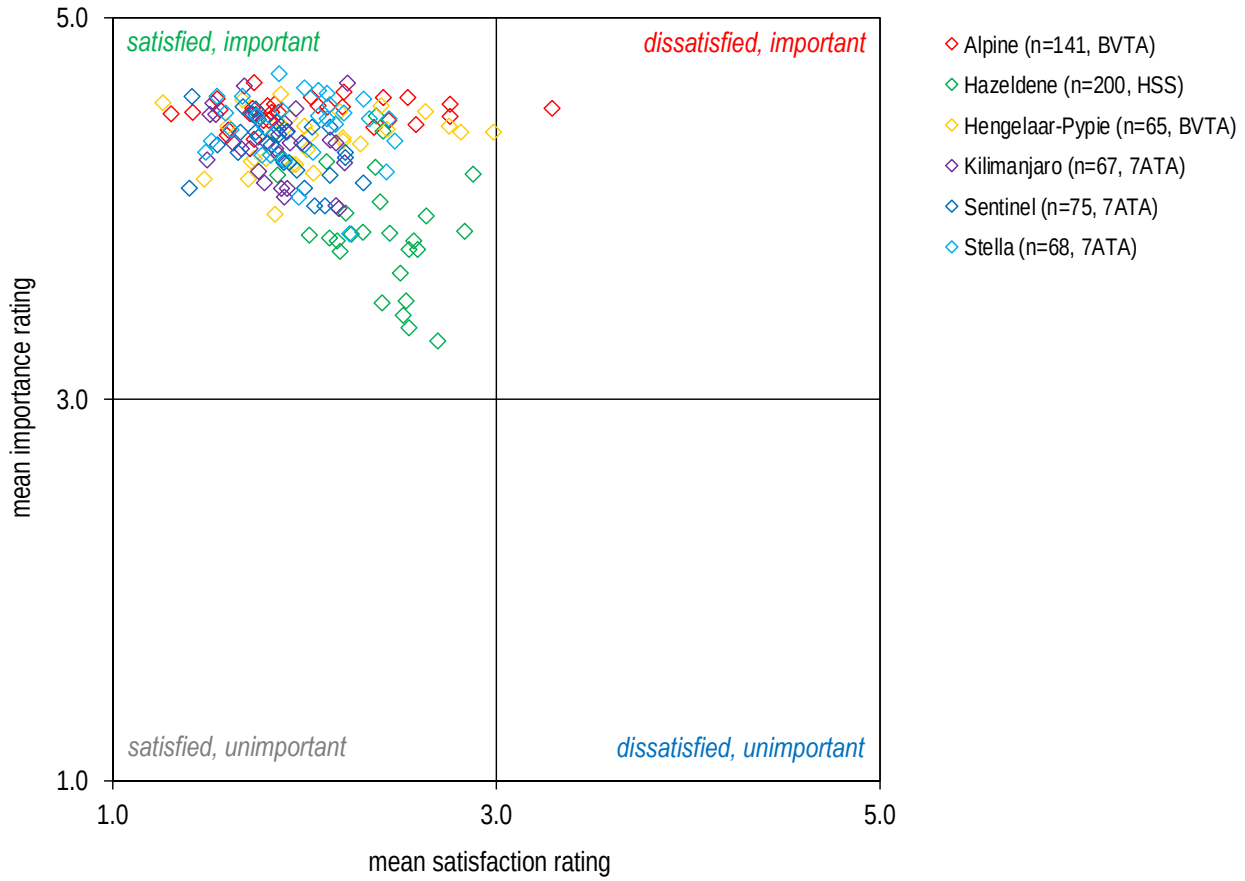


Figure 4. ***Service attribute satisfaction and importance rating, by service route: All passengers (n=616)***

Figure 5 reveals that the top three most satisfactory service attributes were: boarding and alighting location (i.e. proximity of service to trip origins and destinations); method of payment (i.e. cash fare collection); and passenger information at the rank. The top ranked 'keep up the good work' (important satisfied) quadrant attributes were: boarding and alighting location; trip time; and rank weather protection. It is interesting to note that the efforts by HSS to provide financially unviable early morning services (between 04h30 and 06h30) as a means of promoting customer loyalty (revealed in earlier research on service span and headways, Behrens *et al* 2017) appear to be fairly effective: 77% of HSS passengers indicated that they would rather wait for a HSS vehicle than use a competitor – the equivalent values for BVTA and 7ATA were 17% and 8% respectively.

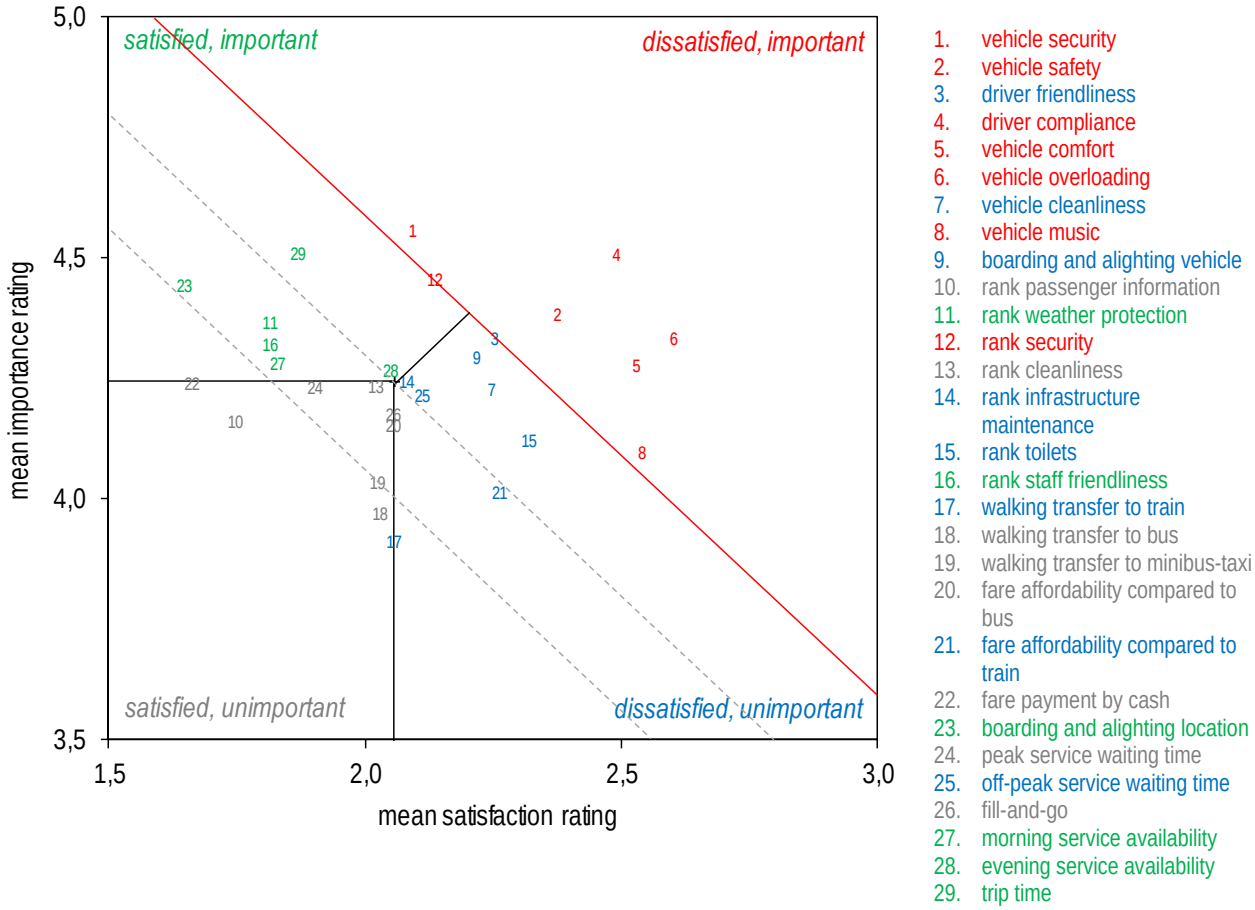


Figure 5. ***Service attribute satisfaction and importance rating: All passengers (n=616)***

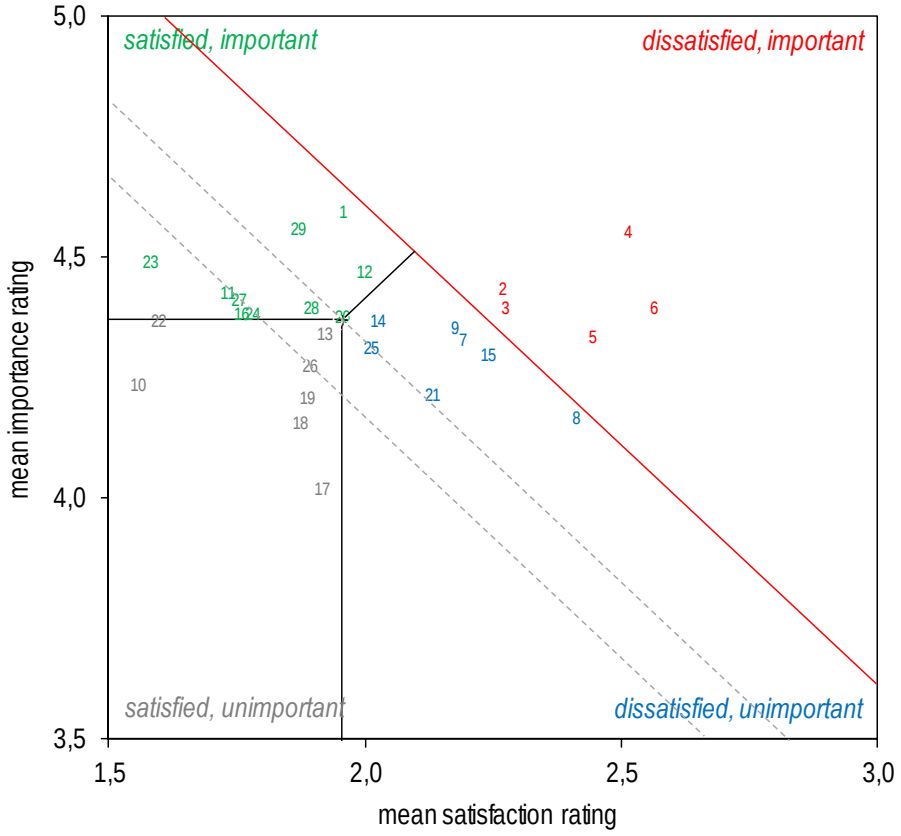
The top three most important service attributes were: personal security in the vehicle; trip time; and driver compliance (i.e. obeying traffic laws and safe driving behaviour). The top three most dissatisfactory service attributes were: vehicle comfort; vehicle music; and vehicle overloading. The top three 'concentrate here' (important dissatisfied) quadrant service attributes were: driver compliance; vehicle overloading; and vehicle comfort.

When focussing particularly on the service attributes over which the MBT associations have direct control, it would appear there is considerable autonomy for implementing improvements. Five of the seven attributes in the 'concentrate here' (important dissatisfied) quadrant are attributes over which the MBT associations have direct control: driver compliance; vehicle overloading; vehicle comfort; vehicle safety; and vehicle music – through improved driver training and management, and improved vehicle fleet maintenance and renewal. A priority improvement for the city authority would be rank security.

3.2 Transferring passengers

When analysing only passengers who transferred to another mode at the public transport interchange (on all service routes), it was found that passengers are generally satisfied with the five service attributes in the questionnaire that were directly associated with mode transfer (rank passenger information, walking transfer to train, walking transfer to bus, walking transfer to minibus-taxi, and fill-and-go [i.e. maximising fare box revenue per service kilometre by only departing the rank once the vehicle is full or near-full]). These five attributes fall into the top half of the satisfaction ranking, and the bottom half of the priority rankings (representing five of the 11 attributes plotted in the first quartile) (see figure 6). Passenger

information at the rank is one of the top three most satisfactory service attributes (the others are boarding and alighting location and payment medium).



1. vehicle security
2. vehicle safety
3. driver friendliness
4. driver compliance
5. vehicle comfort
6. vehicle overloading
7. vehicle cleanliness
8. vehicle music
9. boarding and alighting vehicle
10. rank passenger information
11. rank weather protection
12. rank security
13. rank cleanliness
14. rank infrastructure maintenance
15. rank toilets
16. rank staff friendliness
17. walking transfer to train
18. walking transfer to bus
19. walking transfer to minibus-taxi
20. fare affordability compared to bus
21. fare affordability compared to train
22. fare payment by cash
23. boarding and alighting location
24. peak service waiting time
25. off-peak service waiting time
26. fill-and-go
27. morning service availability
28. evening service availability
29. trip time

Figure 6. ***Service attribute satisfaction and importance rating: Transferring passengers (n=376)***

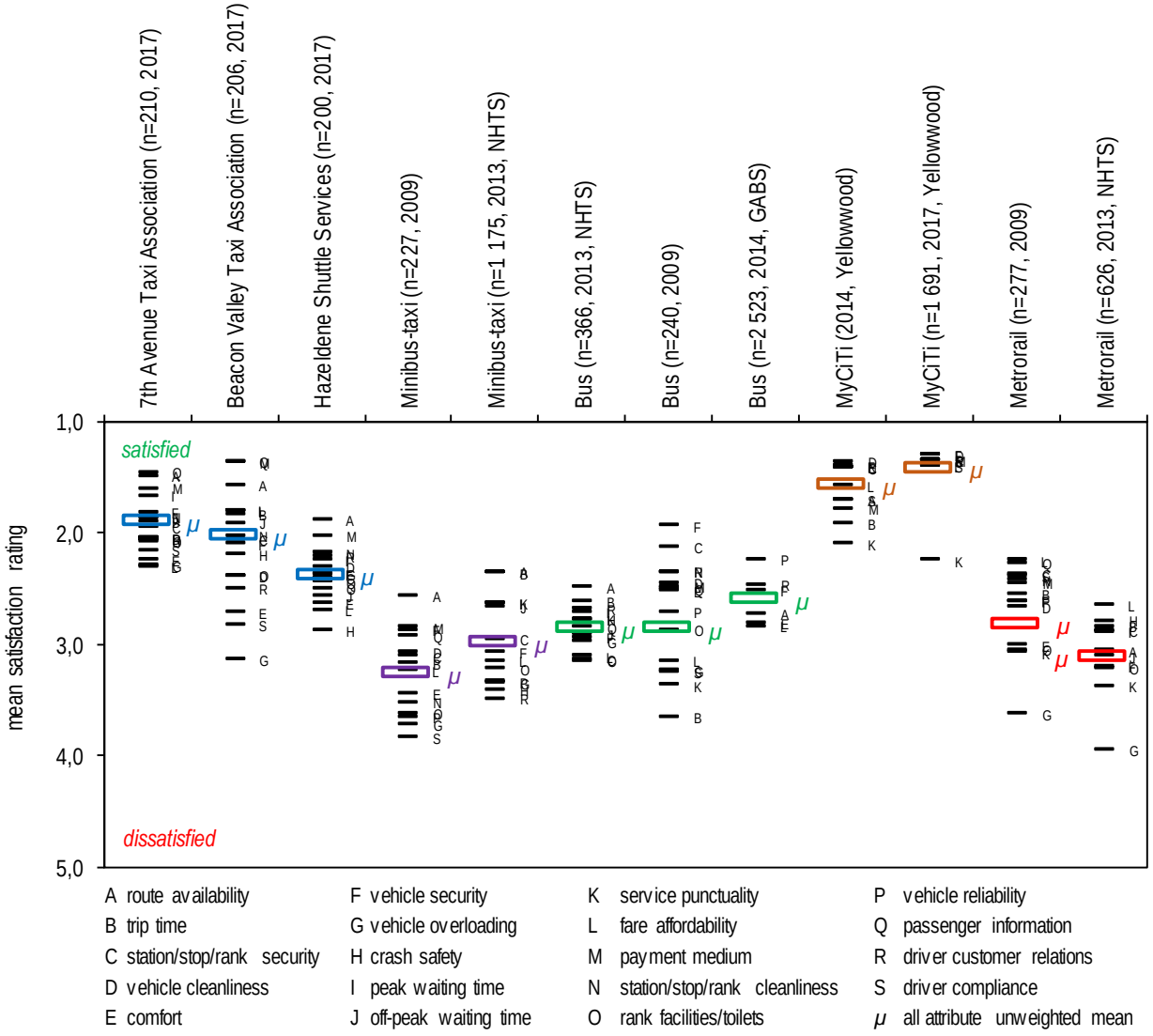
The top ranked 'keep up the good work' (important satisfied) quadrant attributes were the same as for all passengers (boarding and alighting location; trip time; and rank weather protection). Customer loyalty did not change significantly amongst transferring passengers: 77% of HSS passengers indicated that they would rather wait for a HSS vehicle than use a competitor, compared to 18% and 9% of BVTA and 7ATA passengers respectively.

Transferring passengers did not attach higher importance to the mode transfer-specific service attributes: all five attributes directly associated with mode transfer rank within the seven least important attributes. Of particular interest to the earlier research on HSS's service span and departure headways in relation to arriving line-haul minibus-taxi, bus and train services (Behrens *et al* 2017), 'fill-and-go' behaviour was not ranked as relatively unsatisfactory, important, or as an improvement priority.

The top three 'concentrate here' (important dissatisfied) quadrant service attributes were the same as for all passengers (driver compliance, vehicle overloading, and vehicle comfort). No particular improvement priority for transferring passengers emerged from the data analysis. General service quality improvements through improved driver training and management, and improved vehicle fleet maintenance and renewal on the side of the operators, and improved rank security on the side of city authority, would serve to improve quality of service for transferring passengers as well.

4. COMPARISON

This section endeavours to establish how passenger ratings found amongst MBT feeder/distributor service passengers in Mitchells Plain compare to other public transport modes in the city.



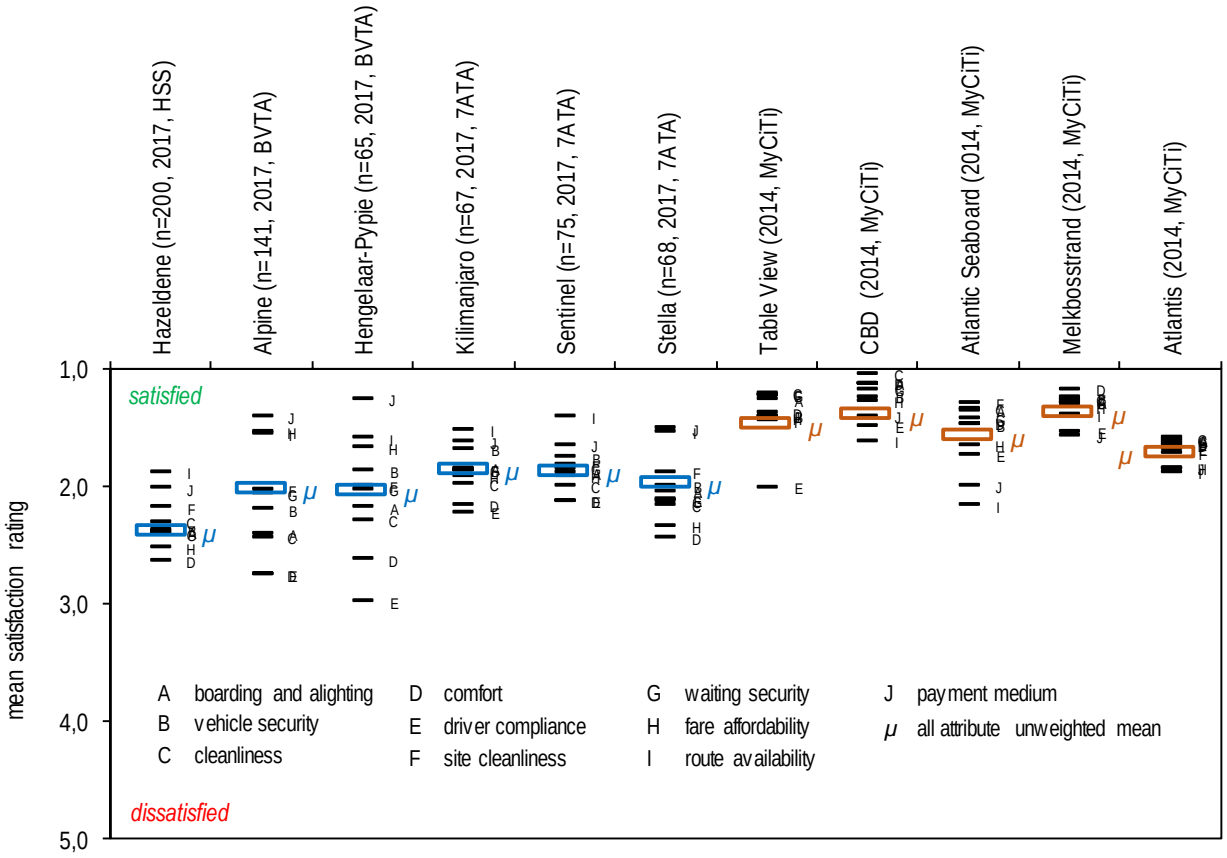
Data sources: Behrens and Schalekamp 2010; Farmer *et al* 2014; Stats SA 2014; Yellowwood 2014 2017
Note: The service attributes presented in the chart are only those common to the various satisfaction surveys. When a service attribute is missing, this is because that attribute was not included in the survey. The unweighted means (μ) are calculated from all service attributes in the source data, not from the attributes included in the chart.

Figure 7. ***Comparative network-wide service satisfaction rating data, by mode (2009-2017)***

Such comparisons with secondary datasets, inevitably collected at different points in time, are methodologically problematic. Customer satisfaction is widely accepted in market research to be the result of a cognitive process in which respondents compare expectations of service quality with perceptions or experience of service quality. Expectations arise from the customer's preferred level of performance, constrained by the level of performance believed to be possible based on experiences with other brands (Zeithaml *et al* 1993). Exposure to a new public transport mode, offering a higher quality of service than existing modes, might therefore influence respondents' expectations of service, even if this

adjustment occurs gradually over time (i.e. satisfaction is a moving target). Thus, it is possible that the introduction of MyCiTi BRT and express bus services in 2011 had the effect of changing respondents' satisfaction with existing modes, even if there was no actual change in the quality of existing services. This suggests that, notwithstanding the problem of standardising diverse satisfaction metrics, comparisons of satisfaction data from different cross-sections in time may be skewed.

Figure 7 compares the Mitchells Plain MBT associations with available secondary data (from the past decade) on network-wide passenger satisfaction in Cape Town. The chart reveals that the Mitchells Plain MBT feeder/distributor services compare favourably with the city's network-wide train, bus and MBT services. The relative rating of MBT, BRT, conventional bus, and train network services is intuitively correct, although it is probable that a more recent measurement of Metrorail services would have yielded a lower overall satisfaction rating. Only the MyCiTi network has received consistently higher satisfaction ratings than the Mitchells Plain MBT feeder/distributor services (even if Ugo 2014 did find more comparable, less positive ratings). Importantly, these comparative data suggest that passengers are considerably more satisfied with MBT feeder services than with the broader MBT city-wide network (which is dominated by longer distance line-haul service routes), and that quality of service in the MBT sector is therefore not homogeneous.



Data source: Yellowwood 2014

Notes:

1. The service attributes presented in the chart are only those common to the various satisfaction surveys. When a service attribute is missing, this is because that attribute was not included in the survey. The unweighted means (μ) are calculated from all service attributes in the source data, not from the attributes included in the chart.
2. MyCiTi data from 2014 are used for comparative purposes as passenger satisfaction was reported on a route basis. The 2017 passenger satisfaction data was reported on an area basis. A comparison of route data and area data indicates similar ratings across the two time periods. Overall satisfaction ratings were: CBD 1.40 (2014):1.50 (2017); Atlantic Seaboard 1.58 (2014):1.35 (2017); Melkbosstrand 1.38 (2014):1.50 (2017); and Atlantis 1.73 (2014):1.45 (2017).

Figure 8. ***Comparative feeder/short-haul service satisfaction rating data (2014-2017)***

Figure 8 compares the Mitchells Plain MBT feeder/distributor service routes with available secondary data on MyCiTi feeder or short-haul service route passenger satisfaction. The chart reveals that the MyCiTi service routes consistently outperform the MBT feeder/distributor service routes, but there are a couple of individual service attributes in which the MBT services are rated higher (most notably related to service route proximity and flexibility). Improvement efforts are therefore warranted.

5. CONCLUSION

This paper set out to explore levels of satisfaction amongst passengers using unscheduled feeder/distributor services operating out of the Mitchells Plain public transport interchange, and to identity the attributes of these services that require priority improvement in the pursuit of a complementary hybrid service network.

With regard to levels of satisfaction, the research does not provide a basis to expect that passengers will be unsatisfied with a hybrid network. Comparison with available secondary data suggests that the Mitchells Plain MBT feeder/distributor services are perceived by passengers to offer a higher quality of service than the broader city-wide MBT network. This indicates that passenger satisfaction is not homogenous in the MBT sector. Indeed, these MBT feeder services compare favourably with passenger satisfaction with conventional bus and train services as well. Only MyCiTi bus services provides higher passenger satisfaction overall, although MBT feeders are perceived to be more satisfactory with respect to attributes related to service route proximity and flexibility.

With regard to priority improvement, on the basis of the survey findings it is recommended that, where possible, the Mitchells Plain MBT associations concentrate their efforts on improving driver compliance, vehicle overloading, vehicle comfort, vehicle safety and vehicle music, through improved driver training and management, and improved vehicle fleet maintenance and renewal. It is recommended that the city authority supports the MBT associations in implementing improvements (e.g. through facilitating training programmes and vehicle maintenance incentives) and concentrates its own improvement efforts on rank security. From the perspective of creating a complementary hybrid service network, notwithstanding the need for additional off-peak feeder/distributor service to match the service spans of trunk services, it does not appear that, from a transferring passenger viewpoint, any specific improvements are necessary to improve satisfaction levels. The above general improvements would serve to improve their quality of service as well.

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REFERENCES

Abalo J, Varela J and Manzano V, 2007: Importance values for Importance-Performance Analysis: A formula for spreading out values derived from preference rankings, *Journal of Business Research*, Vol 60, pp115-121.

Bacon D, 2003: A comparison of approaches to Importance-Performance Analysis, *International Journal of Market Research*, Vol 45, No 1, pp55-71.

Behrens R and Salazar Ferro P, 2016: Barriers to comprehensive paratransit replacement, in Behrens R, McCormick D and Mfinanga D (eds), *Paratransit in African cities: Operations, regulation and reform*, Routledge, New York.

Behrens R and Schalekamp H, 2010: *Public transport mode satisfaction in Cape Town: Findings of a passenger intercept survey*, 29th Southern African Transport Conference, Pretoria.

Behrens R and Schalekamp H, 2011: *Sensitivity testing of alternative public transport passenger satisfaction analysis techniques*, 30th Southern African Transport Conference, Pretoria.

Behrens R, Zuidgeest M, Hawver H and Birungi C, 2017: *Case study investigation of unscheduled feeder and scheduled trunk service relationships in Cape Town*, 36th Southern African Transport Conference, Pretoria.

Beirão G and Cabral J, 2007: Understanding attitudes towards public transport and private car: A qualitative study, *Transport Policy*, Vol 14, pp478-489.

Birungi C, 2017: *Effects of feeder network operations on trunk-feeder network performance: A case study of Mitchells Plain, Cape Town*, Master of Science in Engineering, 120-credit dissertation, University of Cape Town.

CoCT, 2015: *Game-changing policy for minibus-taxi industry to serve before Council*, Media release, City of Cape Town, Cape Town.

Dodgen S, 2017: *Minibus-taxi passenger satisfaction survey at Cape Town's Hazeldene taxi rank*, Final year Civil Engineering undergraduate research project, University of Cape Town.

DoT, 2005: *National household travel survey 2003: Technical Report*, Department of Transport, Pretoria.

DoT, 2007: *Public transport strategy*, South African Department of Transport, Pretoria.

Farmer J, Farrar T and Mtemeri N, 2014: *Customer satisfaction survey for Golden Arrow Bus Services*, Golden Arrow Bus Services, Cape Town

Fusire T, 2017: *Beacon Valley Taxi Association minibus-taxi passenger satisfaction measurement*, Final year Civil Engineering undergraduate research project, University of Cape Town.

Govender K, 2014: Service quality in the South African Road public transportation industry: Comparing bus and mini-bus taxi service, *Journal of Human Ecology*, Vol 47, No 1, pp7-15.

HvR, 2014: *Expenditure and performance review of South Africa's public transport and infrastructure system*, Report prepared by Hunter van Ryneveld for the Presidency and National Treasury, Pretoria.

Martilla J and James J, 1977: Importance-performance analysis, *Journal of Marketing*, Vol 41, pp77-79.

Mukhuba T, 2017: *Minibus-taxi passenger satisfaction measurement for 7th Avenue Taxi Association*, Final year Civil Engineering undergraduate research project, University of Cape Town.

Plano C, Behrens R and Zuidgeest M, 2018: *Towards a stated choice methodology to determine minibus-taxi driver willingness to provide off-peak feeder service*, 37th Southern African Transport Conference, Pretoria.

Stats SA, 2014: *National household travel survey: February to March 2013*, Statistical release P0320, Statistics South Africa, Pretoria.

TRB, 1999: *A handbook for measuring customer satisfaction and service quality*, TRCP Report 47, Transportation Research Board, Washington.

TRB, 2004: *Transit capacity and quality of service manual*, TRCP Report 100, 2nd edition, Transportation Research Board, Washington.

Ugo P, 2014: The bus rapid transit system: A service quality dimension of commuter uptake in Cape Town, South Africa, *Journal of Transport and Supply Chain Management*, Vol 8, No 1, pp1-10.

Vilakazi A and Govender K, 2014: Commuters' perceptions of public transport service in South Africa, *Journal of Social Sciences*, Vol 3, No 1, pp258-270.

Von der Heyden C, Laing K, Hastings E, Koch P and Reddy T, 2015: *Financing IRPTN operations: Considerations for cities implementing I(R)PTNS in South Africa*, 34th Southern African Transport Conference, Pretoria.

Yellowwood, 2014: *MyCiTi customer insights programme*, Summary presentation, Cape Town.

Yellowwood, 2017: *Current routes state of service survey*, Written report, Cape Town.

Zeithaml V, Berry L and Parasuraman A, 1993: The nature and determinants of customer expectations of service, *Journal of the Academy of Marketing Science*, Vol 21, No 1, pp1-12.