PERCEIVED REALITY:

Understanding the relationship between customer perceptions & operational characteristics

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STUDY PURPOSE

Ensuring that customers are satisfied with public transit is important, as satisfied customers are likely to demonstrate loyalty by continuing to use the service over time.

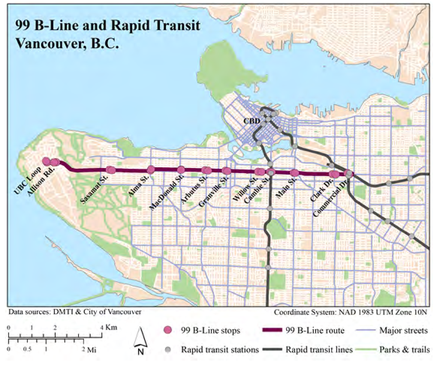
The purpose is: **to examine the drivers of public transit satisfaction among users based on an analysis of customer satisfaction questionnaires, as well as operations data obtained from automatic vehicle location (AVL) and automatic passenger counter (APC) systems for an express bus route in Vancouver, Canada.**

We seek to:

- understand what are the main factors influencing customer satisfaction in this context, and
- question whether using operations data in parallel with passengers' perception data is useful to understand customer satisfaction.

DATA

Context map for 99 B-Line in Vancouver, B.C.



SUMMARY STATISTICS

Income:		Employment:		Education:	
under $35,000	22%	Full time	48%	Some high school	4%
$35,000-$65,000	26%	Part time	15%	Grad. high school	10%
$65,000-$95,000	20%	Student	11%	College	16%
$95,000 +	32%	No job	25%	Some university	13%
				Graduated university	57%

Age:		Previous usage:		Tripe time:	
16-24 years old	11%	Less than a year	6%	AM peak	28%
25-34 years old	12%	2-5 years	26%	Day time	40%
35-44 years old	19%	6-10 years	20%	PM peak	32%
45-54 years old	20%	12 years +	49%		
55-64 years old	19%				
65+ years old	19%				

Car access:		AVL/APC data:	
Yes	63%	Average trip time	35.2mins
No	37%	Average delay	-1.7mins
		Average arrive load	37.2

Satisfaction with the 99 B-Line
Average satisfaction: 76% — Percentage of users very satisfied: 61%

Satisfaction with crowding
Average satisfaction: 52% — Percentage of users very satisfied: 25%

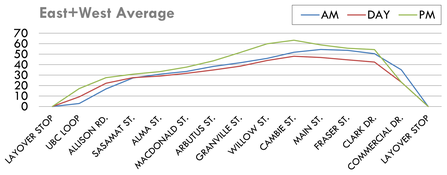
Satisfaction with frequency
Average satisfaction: 82% — Percentage of users very satisfied: 76%

Satisfaction with on board safety
Average satisfaction: 84% — Percentage of users very satisfied: 79%

Satisfaction with cleanliness
Average satisfaction: 79% — Percentage of users very satisfied: 64%

Data used to assess customer satisfaction

Average leave load per stop



ANALYSIS

Logistic modelling results

Satisfaction with bus service	MODEL 1			MODEL 2			MODEL 3		
DEPENDENT VARIABLE									
Overall satisfaction: where 1-7 = not satisfied, and 8-10 = satisfied									
	OPERATIONS			OPERATIONS +PERSONAL			PERCEPTION + PERSONAL		
	OR	2.5 %	97.5 %	OR	2.5 %	97.5 %	OR	2.5 %	97.5 %
(Intercept)	2.348 ***	1.711	3.246	1.218	0.658	2.242	0.00007***	0.00001	0.0004
REALITY VARIABLES									
Crowding									
Extreme crowding	0.166 ***	0.046	0.594	0.236**	0.062	0.895			
PERSONAL CHARACTERISTICS									
Vehicle access	---	---	---						
No car access				1.395**	1.014	1.926	1.512**	1.011	2.275
Age	---	---	---						
16-34 yrs old				0.765	0.507	1.158	1.035	0.623	1.726
35-54 yrs old	---	---	---	0.559***	0.391	0.797	0.859	0.549	1.346
55+ yrs old	---	---	---	NA	NA	NA	NA	NA	NA
Past use	---	---	---						
More regularly				2.408***	1.273	4.615	1.944	0.860	4.455
The same	---	---	---	2.270***	1.320	3.923	1.873 *	0.940	3.785
PERCEPTION VARIABLES									
Satisfaction									
Crowded							1.403***	1.294	1.526
Frequency							1.682***	1.445	1.975
On-board safety							1.280***	1.097	1.502
Cleanliness							1.199**	1.034	1.393
Goodness-of-Fit measures	N=737 AIC: 979.9 BIC: 989.1 Error rate: .13†			N=737 AIC: 964.2 BIC: 996.4 Error rate: .13†			N=737 AIC: 666.6 BIC: 712.6 Error rate: .14†		

Signif. codes: 0.001 '***' 0.01 '**' 0.05 '*'
--- = Not in model, NA = Reference Category
†Thresholds for error rates are based on maximizing sensitivity and specificity as indicated by ROC curves.

Both actual crowding and users' reported satisfaction with crowding influence how transit users perceive satisfaction with the bus service.

1
- As users experience more **crowding**, their satisfaction **decreases**.

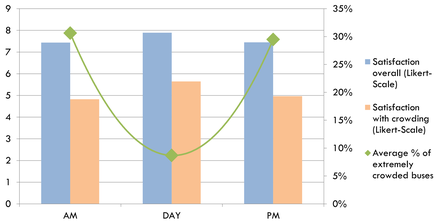
2
- For every unit increase in **crowding**, the odds of being satisfied **decrease** by 76%
- The odds of being satisfied for users who **do not have access to car** is 40% **higher** than those that do have a car,
- The odds of being satisfied for users **aged 35-54** is 44% **lower** than for older users (55+).

3
- For every unit increase in satisfaction with **frequency** (Likert-Scale 1-10) that a user experiences, the odds that a user is satisfied with the route **increases** by 68%.
- Similarly, a one unit increase in satisfaction with **crowding**, **on-board safety**, and **cleanliness** is associated with 40%, 28%, 20% increases in the odds of being satisfied.
- Users who **do not have access to a car** have an **increased** odds of 51% compared to those who do have access to a car.

Eastbound AM crowding - Cambie Street


Westbound AM crowding - Cambie Street

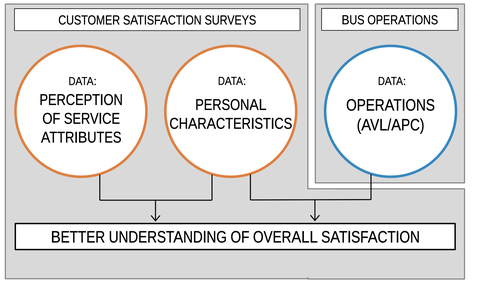

Variation in satisfaction vs. variation in actual crowdedness



The variation in **actual crowding** changes much more than that of **perceived** overall **satisfaction** and with **crowding** over different time periods. Possible explanations include: users' **expectations about crowding change** over the day, or different populations are using the bus during the peak and off-peak periods. Yet, few statistically significant differences were observed between the groups traveling at different time periods.

CONCLUSION

How to assess customer satisfaction



Future studies should:

- assess **multiple routes** with more variation to be able to test the variety of data that can be derived from AVL/APC data, and
- use **fare card data** to map individuals to specific trips.

Transit agencies would benefit from:

- collecting information about **where** and **when** passengers board and alight in the customer satisfaction questionnaires

Overall, the results of this study demonstrate the **complex relationship** between users' **perceptions** of transit with what is **actually happening** on the ground. These findings suggest that users' **expectations of transit may be changing** over the day, and results could be used to assist transit agencies to identify which modifiable components of the service should be prioritized in order to effectively **increase overall rider satisfaction** through service improvements.

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