Erasmus Research Institute of Management (ERIM) PhD Series, No. 345
Passengers, Information, and Disruptions. PhD Thesis, Erasmus University Rotterdam.

Evelien van der Hurk (2015)

https://www.researchgate.net/publication/293593361_Passengers_Information_and_Disruptions

This thesis provides quantitative metrics for measuring passenger inconvenience in public transport during service disruptions. Firstly, they calculate time spent waiting at 3x the rate of time spent in-vehicle, citing Quarmby's 1967 article "Choice of travel mode for the journey to work," [1]

The determine transfers as inherently inconvenient, especially when they are not synchronized/coordinated, as they note is the case for Boston's MBTA.

She notes passengers will accept transfers if they save meaningful travel time, which she quantifies as a minimum 1 minute gain, which seems negligible to me. Having spent much of my life in Boston, I don't think that's simply a difference between the expectation between the MBTA and MTA.

To quantify the inconvenience, they use dollar values built from the average wage in Massachusetts. For my model for NYC's MTA, it has been discussed to calculate in terms of time, not dollars, and I still believe this is preferable since it is directly the variable being measured.

She proposes a "Definition of Passenger Inconvenience (PI), defined as: the sum of the differences in costs of paths with and without the disruption when considering

- Waiting time (for first vehicle and at transfers)
- In-vehicle time
- Transfer penalties

She then proposes the formula:
Cost_path = Σ(waiting_time × 3 + in-vehicle_time × 1 + transfer_penalty)

*when it comes to this, what is the value of transfer penalty?

She conducted a case study on Boston's Red Line, and found that the standard impact of a closure increased customer inconvenience by 26%, and found that 28% of passengers experienced this inconvenience. She found that when disruption solutions were optimized to minimize inconvenience, this could be reduced by half (from 10 mins on average to 4-6).

She also created a logit model for probabilistic route choice when passengers have multiple route options, using the formula: P(path_i) = e^(θ × cost_i) / Σ(e^(θ × cost_j)) Where: θ = -0.2 (calibrated parameter)

She found that even if the difference between paths is 15 minutes, 5% of passengers will take the longer standard path reflecting inertia/habit.

[1] Journal of Transport Economics and Policy, 1:273–314

Humanities and Social Sciences Communications volume 8, Article number: 190 (2021)

The impact of commuters' psychological feelings due to delay on perceived quality of a rail transport

Mahdi Rezapour & F. Richard Ferraro

https://doi.org/10.1057/s41599-021-00865-z

Mahdi Rezapour & F. Richard Ferraro sought to obtain passenger opinions regarding delays and the perceived quality of the transport. To this end, the researchers employed an ordered mixed logit model in order to conduct their analysis. They believed and took into account that perceptions would be impacted by factors such as the commuters' objectives of travel.

Their respondents numbered 396 and were not a random sample. They were primarily female and between the ages of 15-25. This is important to consider, as the sample is not representative of a wider population. They found that:

> "six physical (neck pain, muscle stiffness, increased heartbeat, drawing sensation in the body, feeling nervous and feeling tired), and two psychological factors (feeling disgusted and anxiety) were found to be important in the prediction of the perceived quality of KTM due to delay"

They draw heavily on the idea of "mindsponge" which they attribute to Vuong (2016), and describe as essentially being an individual's capability for "squeezing out inappropriate values and absorbs new ones that fit the context at hand"

They conclude that "while some commuters react to the shortcoming of transport delay mildly, others react more severely", sating that women are more likely to be impacted than men, consistent with their hypothesis. However, since their sample is heavily female-skewed, this could simply be due to their having more data on women.