

Exercise 6. Perceived travel cost in private and public transport

In this exercise, please determine the perceived journey cost for a trip between i^b (your) and j^b (your friend's) traffic analysis zone (TAZ)- in the afternoon peak hour (3 pm) and in the evening (8 pm) for public transport (PuT) and private transport (PrT). Assume that the trip is made between TAZs' centroids and based on this, please determine the travel cost of consecutive trip stages.

To find an optimal connection with PuT you can use the trip planner krakow.jakdojade.pl. For PrT , please use map service which provides typical car travel times for different times of the day (e.g. Google Maps or Targeo.pl).

a) PuT trip stages:

trip stage	symbol	value		relative weight [a_i]	PuT travel cost [PLN]	
		afternoon peak	evening off-peak		afternoon peak	evening off-peak
access time from trip origin - to the first stop [min]	t_a			2		
waiting time on first stop [min]	t_w			2		
transfer(s) time [min]	t_t			2		
(in-vehicle) ride time [min]	t_r			1		
egress time from the last stop - to trip destination [min]	t_e			2		
number of transfers [-]	n_t			5		

b) PrT trip stages:

trip stage	symbol	value		relative weight [a_i]	PrT travel cost [PLN]	
		afternoon peak	evening off-peak		afternoon peak	evening off-peak
access time from the trip origin to car [min]	t_a			2		
ride time [min]	t_r			1		
searching time for parking spot [min]	t_p	SPP^1 5 min	2 min	2		
		outside SPP 2 min	1 min			
egress time from car to the trip destination [min]	t_e			2		

c) the perceived journey cost is composed of time costs (i.e. weighted sum of the trip time components multiplied by their respective weights) and monetary costs (i.e. PuT ticket price or PrT parking cost in SPP, and operating/running costs of the private car). These are calculated using formulas below:

$$C_{ij}^{PuT} = (a_{t_a} t_a + a_{t_w} t_w + a_{t_t} t_t + a_{t_r} t_r + a_{n_t} n_t + a_{t_e} t_e) \cdot C_t + C_{tk}$$

$$C_{ij}^{PrT} = (a_{t_a} t_a + a_{t_r} t_r + a_{t_p} t_p + a_{t_e} t_e) \cdot C_t + C_p + l \cdot C_e$$

where:

a_i	relative cost weight of a trip stage i
t_i	time duration of a trip stage i [min]
$t_w = \frac{1}{2} \cdot \frac{60}{f}$	expected waiting time on the first stop for $f \geq 6$; for $f < 6$ assume 5 [min]
f	service frequency ² [departures/hour]
l	trip length [km]
C_t	time cost factor [0.25 PLN/min]
C_e	operating/running cost factor of the private car [1.00 PLN/km]
C_{tk}	PuT ticket cost (one-way ticket, without discounts)
C_p	PrT parking fee cost in SPP (2 hours)

¹ SPP – paid parking zone

² number of bus/tram departures (per hour) available from the first stop in the direction of trip destination – please consider all possible lines providing connection between analyzed places

1. passenger has a free PuT ticket,

- Please write down all calculations.

PuT travel cost [PLN]

PrT travel cost [PLN]

PuT travel cost [PLN] for afternoon peak and evening peak-off:

[illegible][illegible][illegible][illegible][illegible][illegible]