Let's Solve the Problem

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1 The Model

The profit is:

$$profit = (r_m * p_r * (A - B * d^2)) - (N_{ps} * (C - D * d) + N_{park} * C_{general} + E * d)$$

(euro/day)

Because we know $p_r = 76.8$(euro/day). $N_{ps} = 125$ and $N_{park} = 75$ by the estimation conducted by TripCar, the profit can be rewritten as the function of d:

$$profit = (r_m * 76.8 * (A - B * d^2)) - (125 * (C - D * d) + 75 * C_{general} + E * d)$$

Considering the FOC(First Order Condition), we obtain the following equation:

$$p'(d^*) = -2B * 76.8 * r_m * d + 125 * D - E = 0$$

$$d^* = \frac{125 * D - E}{2B * 76.8 * r_m} \tag{1}$$

(Here, we differentiate the profit function $p(d)$ by d. d^* is the optimal d which maximizes the profit.)

2 Analysis

2.1 How to solve the problem

1. Assign certain values to A, B, C, D and E.
2. Calculate d^*
3. Choose the parking lots whose d is the closest to d^*. This alternative is the one we should choose.
4. Assign d of this alternative and calculate the profit.

2.2 Sensitivity Analysis

Change the value of A, B, C, D and E, and check if the result (the parking lot we should choose) will change or not. No need to calculate the profit. Just check if the optimal parking lots will change or not.