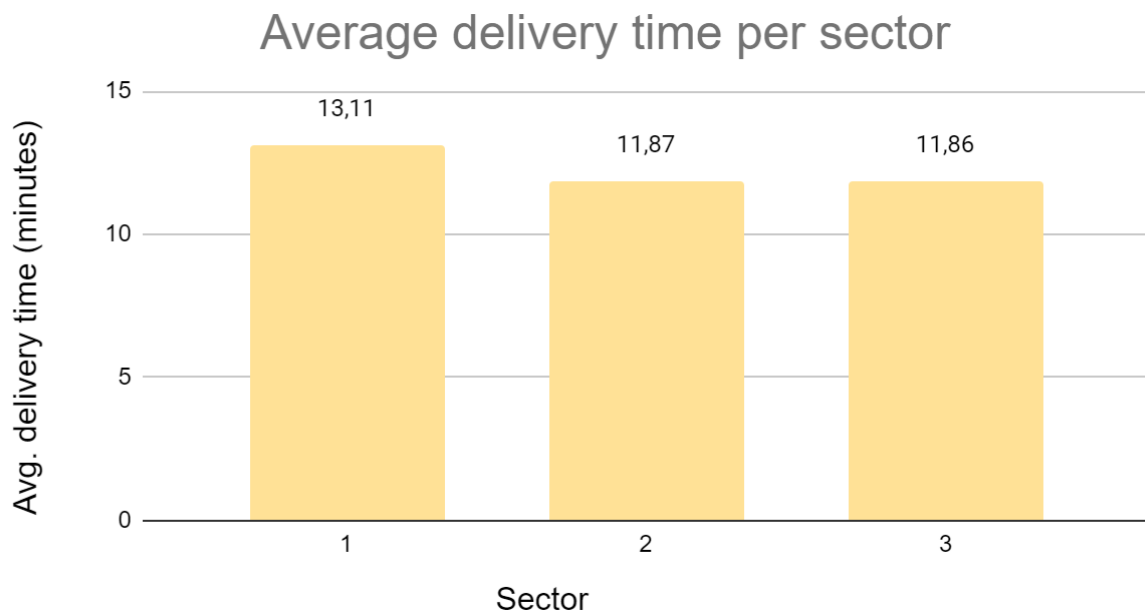


Task 1

I counted an average delivery time in each sector. It shows the graph below.



The average delivery time in sector 1 is about 10% longer than in the rest of sectors. It makes sense to calculate an expected time per sector. It helps to predict expected delivery time a bit better.

Task 2

Alternative methods for predicting the delivery time more accurately

Option 1 - by order's weight

The better option to calculate the expected delivery time is to classify each order by weight into the one of the following four categories and assign it the corresponding time in Table 1.

Order's weight	< 4 kg	4 - 8 kg	8 - 16 kg	16 kg <
Average delivery time (minutes)	11,83	12,49	13,57	14,78

Table 1 - average delivery time per weight range

Option 2 - by order's weight and sector

With the data I have, even better option for prediction the delivery time would be to calculate:

- The mean delivery time in each sector - above, in task 1 there is a graph which shows it.
- The sector ratio between delivery in each sector - it's ~1,1 between sector 1 and others.

Sector	1	2	3
Sector ratio	1,10	1,00	1,00

Table 2 - sectors' ratio calculated by delivery time in each sector

- The average delivery time for each of the four weight categories, but the time in each sector is divided by its sector ratio (Table 2) - calculated in Table 3.

Order's weight	< 4 kg	4 - 8 kg	8 - 16 kg	16 kg <
Average delivery time (minutes)	11,48	12,38	13,14	14,11

Table 3 - average delivery time per weight range

Right now with more accurate data Table 3, all you need to count the expected delivery time is to classify each order by weight into one of the four categories in Table 3. And if the order's sector_id = 1, the expected delivery time is the time in Table 3 multiplied by sector ratio.

Option 3 - by order's weight, sector and the driver

But probably the best option would be to take the times from option 2 and multiply it by the proper driver's ratio. I will calculate the driver ratio, using Table 4.

driver_id	1	2	3	4
Average delivery time (minutes)	11,08	12,13	13,42	14,50

Table 4 - average delivery time per driver

To calculate the driver ratio it's needed to divide average delivery time for each driver by the delivery time of the driver with the lowest average time. So the drivers' ratio is shown in Table 5.

driver_id	1	2	3	4
Average delivery time (minutes)	1,00	1,09	1,21	1,39

Table 5 - drivers' ratio

So as I wrote above, the closest possible expected time we can get if we multiply the expected deliveries times from option 2 by the proper driver's ratio.

Validation the methods

To validate the methods, you can calculate the expected delivery time for orders in the database and compare them to the actual delivery times.

To compare which method is better, you can just compare the average difference between expected delivery time and actual one for all of the orders.

Task 3

Some of the deliveries may take more time, because:

- Some buildings don't have elevators.
- Some people don't open the doors immediately.
- The driver has to wait for the client, because he's not home.
- Some people pay the driver using cash and don't have an exact calculated amount of money or the driver doesn't have money for change to give back the rest for the client.
- There isn't a parking place next to the building and the driver has to park somewhere else.
- It's impossible to drive into the housing estate and the driver has to walk through the whole estate.
- The driver got lost/bad building signage.
- The order is really heavy or packed poorly and the driver has to go from car to house a few times.

Task 4

It would be worth to collect the data about:

- If it's a single-family house or an apartment.
- If there is a possibility to park right next to the building.
- In which staircase/after which entrance to the building is the house.
- Some additional information about the location, if it's hard to find the entrance.

Task 5

The risk of the:

1) delayed delivery:

- a) unhappy client/low ratings for the company,
- b) potential delay for others orders,
- c) potential spoiled food if it's not well packed.

2) too soon delivery:

- a) no one in the house,
- b) the client isn't ready to pay for the order/don't have enough money or don't have the exact amount of money to pay.

The biggest problem of the under- or over-estimating delivery time is direct or indirect loss of the money by the company.