

Optimizing the separate waste collection in the Győr region.

The Industrial Problem

GYHG collects the selective waste in the Győr region. The aim of this project is to determine the optimal routes of the garbage trucks in the currently used weekly plan and to verify whether the system can be operated without working overtime with the current truck fleet size.

Széchenyi István University

Research
group



Optimizing industrial problems by
mathematical programming.

GYHG

Company

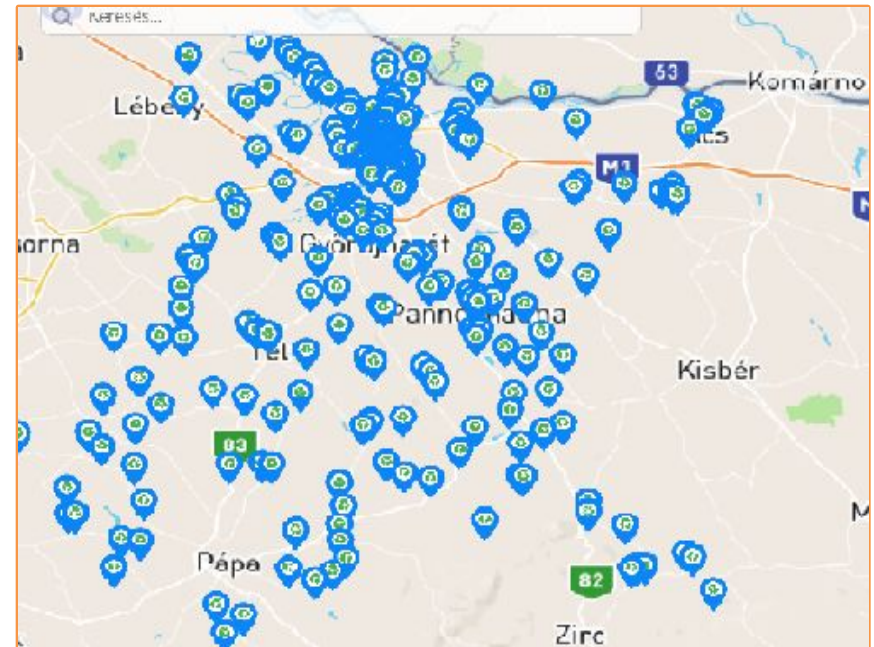


Collecting the separate waste
in the Győr region.

Optimizing the separate waste collection in the Győr region

Challenges & Goals

- Find optimal routes of the garbage trucks.
- Verify whether the current fleet size is sufficient to run the system .
- Make a new weekly plan that does not yield working overtime.



Locations of the the waste collection islands.

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Mathematical and computational methods and techniques applied

- The problem of finding the optimal routes was modeled as a mixed integer linear problem (MILP).
- The MILP models were formulated in GAMS and solved by CPLEX.
- Data processing was done in R.
- Time and distance matrices were obtained by scripting OpenStreetMap.

	Group1	Group2	Group3
plastic	7.8	8.8	12.2
paper	7.7	8.6	12.6
metal	9.7	8.8	9.7

Time (in hour) needed to collect paper, plastic and metal in the region of Győr..

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Results & Benefits to the company

- Results
- Optimal routes of the garbage trucks were found.
- We proved that the current fleet size is not sufficient to operate the system without working overtime.
- We gave a new weekly plan without working overtime that needs two extra trucks.
- Benefits
- Cost reduction.
- The results help the decision makers to decide whether it is necessary to buy new vehicles.

	Monday	Tuesday	Wedn.	Thursd.	Friday	Saturd.	Sunday
Vehicle1	plastic4	plastic1	paper1	plastic4	plastic1	plastic4	m3/m4
Vehicle2	paper4	plastic2	paper2	paper4	plastic2	paper4	
Vehicle3	plastic5	plastic3	paper3	plastic5	plastic3	plastic5	
Vehicle4	paper5	m-gy1	m-gy2	paper5	m1/m2	paper5	

A new weekly plan with 4 vehicles (m: metal).

The results support the work of the decision makers of the company.