

OPTIMISATION OF THE WASTE MANAGEMENT SYSTEM IN ALBANIA

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INTRODUCTION

The waste management system is an environmentally controversial topic in Albania. Albania recently adopted laws in the solid waste management domain in order to adapt its legislation to the European norms. To reach this goal, a national waste management plan has been set up. In a country where the funding is limited, the waste collection is almost only present in urban areas and where the existing landfills might present environmental risks, these objectives represent a real challenge to implement. In order to make this operation viable, the various stages of waste management should be coordinated and optimised to minimise the costs.



OBJECTIVES

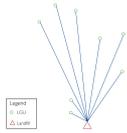
The current system of waste collection and transport in Albania is mostly municipal, if implemented. This means that, in the best case, each municipality (LGU) manages its collection in an individual way and is transporting its waste to, most of the time, landfills not conform to the norms. This procedure will not be accepted by the new norms and therefore the waste will have to be sent to regional landfills. The main goals of this project are therefore to minimise the costs of the waste management system by :

- Locating an optimised number of transfer stations
- Organising the waste collection at a sub-regional scale
- Developing a methodology to apply the optimisation to the whole country
- Determining an efficient sustainable solution for the waste management system

SCENARIOS

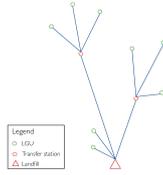
Scenario 0 : Reference

- Each municipality collects its waste and goes directly to the landfill
- In practice, the waste is not always transported to the landfill
- Clearly economically unsustainable solution
- Used as reference scenario to compare with the optimised solutions



Optimised scenarios

- Transfer stations responsible for the waste collection of its assigned municipalities
- Landfill responsible for the collection of the waste at the transfer stations and for the collection of the close enough LGUs



Scenario 1 : Implementation of transfer stations

Variant A :

- No compaction at the transfer station
- Big transportation trucks, small waste density

Advantages	Drawbacks
Simple implementation	Big trucks needed
Little maintenance	Road damage



Open top container



Roll-off truck

Variant B :

- Compaction with self compactor containers
- Smaller transportation trucks, high waste density

Advantages	Drawbacks
Smaller trucks	Higher maintenance costs
Longer life time of landfill	

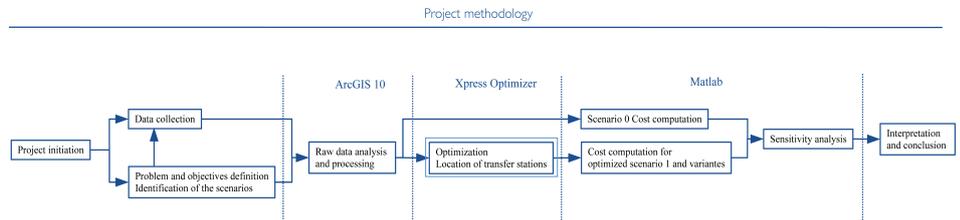


Self compactor container

METHODOLOGY

The methodology developed follows 6 main steps :

- Definition of the objectives, identification of the scenarios, data and software requirements, data collection
- Data processing in a GIS software
- Computation of the optimisation model in Xpress
- Global and detailed costs calculation in Matlab/Octave
- Sensitivity analysis in Matlab/Octave
- Interpretation and conclusion



The most important part in means of cost reduction corresponds to the location of an optimal number of transfer stations.

RESULTS

Location of the transfer stations

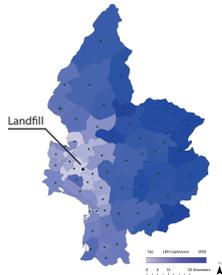
- Optimal number of transfer stations : 5



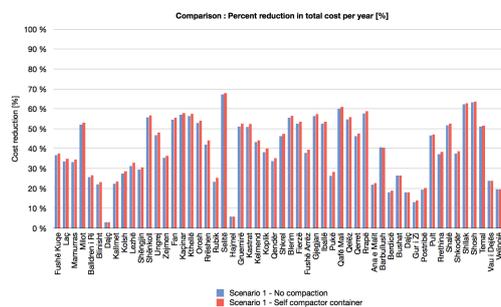
Grouped municipalities and location of the transfer stations (striped)

- Transfer stations in the municipalities of : Lezhë, Rrëshen, Koplik, Pukë, Shkodër

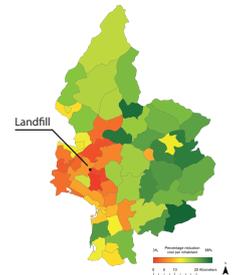
Cost per inhabitant before optimisation



Total costs reduction per LGU after optimisation



Percent reduction in cost per inhabitant - Variant B

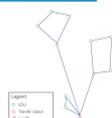


Average costs reduction on a yearly basis

	Total cost with investment	Investment cost	Operating cost	Transportation cost	Collection cost
Sc. 1 - No compaction	- 39 %	+ 25 %	- 57 %	- 63 %	- 73 %
Sc. 1 - Self compactor cont.	- 40 %	+ 24 %	- 58 %	- 65 %	- 73 %

FURTHER IMPROVEMENTS

- Continuous maintenance of the trucks and containers to increase their lifetime
- Recycling at the source of half of the organic waste could decrease the new system's cost by 25 %
- Based on field observations, implement an efficient routing system for the waste collection between the grouped municipalities



CONCLUSION

- The total cost per year is lowered in average by 40 % with the optimisation solutions developed
- Implementation of the 5 transfer stations required
- Inter-municipality organisation necessary
- Best solution for the long term : transfer stations with self compactor containers
- Recycling of half of the organic waste at the households could reduce by another 25 % the costs of the waste management system