



# **Propositions**

attached to the dissertation

## **Operations Research Models for Scheduling Railway Infrastructure Maintenance**

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## I

Integrated planning of production and maintenance leads not only to a better understanding of the relationship between these two most important aspects of any production process, but also to considerable cost savings. However, the integrated planning requires more coordination that makes the problem more complex.

*Chapter 2 of this thesis*

## II

Proper and timely maintenance and renewal of the railway infrastructure is essential for a safe and efficient operation. In order to define what *proper* and *timely* maintenance and renewal is, decision support systems need to be developed. Using these systems decisions such as when, where, to what, for which cost and how much maintenance and renewal should be performed can be made in a structured and scientifically justified way. However, these decision support systems can only be successful when the infrastructure managers are convinced that these are just tools that can help them to do their jobs more efficiently.

*Chapter 3, 4 and 5 of this thesis*

## III

Extending the time between two consecutive executions of the same routine work to its maximal value may seem to lower the maintenance costs. Yet it is likely to create higher maintenance costs because there is less possibility to combine activities in one period.

*Chapter 4 of this thesis*

## IV

In the literature, genetic and memetic algorithms are being seen as techniques suitable for solving large scale scheduling problems due to their robust and fast search capabilities. Indeed, for the preventive maintenance scheduling problem, they prove to be faster than the exact method, however they are not as fast as simple greedy heuristics. Moreover, the two-phase opportunity-based heuristic, which combines genetic algorithm with a problem specific algorithm, can still outperform them.

*Chapter 5 of this thesis*

## V

Finding a solution to the rolling stock rebalancing problem is challenging not only from a scientific, but also from a practical point of view.

*Chapter 6 of this thesis*

## VI

As put by Clive James, “It is only when they go wrong that machines remind you how powerful they are.” Unfortunately, this also applies to the assets of the railway infrastructure.

## VII

Confidence in the banking sector can only return when the public can be persuaded that no excessive risks are being pursued with their savings.

## VIII

The more innovative a company, the better its chance to survive the present economic crisis. However, this may not automatically be the case for companies in the financial sector, since (financial) innovation has been one of the major culprits for the crisis.

## IX

The communist regime in Romania unintentionally stimulated people’s creative skills.

## X

The disadvantage of speaking four languages is that after a while you end up with speaking a fifth language, which is the weighted average of the other four, the weights determined and continuously readjusted by the frequency level of the usage.

## XI

The Hungarian language is very similar to Dutch - as long as your vocabulary is limited to the twenty-or-so words that are the same in both languages.