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OPERATIONS RESEARCH IN CONCRETE DISTRIBUTION: A EUROPEAN PERFORMANCE BENCHMARK

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Abstract

Operations Research (OR) uses mathematical and other appropriate methods to solve complex problems. The combination of OR methods with high computer performance can significantly improve logistics processes and distribution costs.

Over the past 25 years, improvements in computer hardware have resulted in an increase in computing power by a factor of 2,000 times. Linear Programming algorithms, considered one of the most important classes of optimization techniques in OR by many experts, have improved by a factor of 1.4 million times over the same period. When combined, the effects of both advances generate a tremendous 2.8 billion times improvement in processing capability. Or in other words, a planning model, using Linear Programming, that takes a second to solve today, would have taken almost 100 years to solve in the 90's.

The latest software planning tools for concrete distribution use OR methods to analyse a virtually endless number of scheduling decisions within seconds and identify those that are ideal for minimizing costs and maximizing service quality. However, market conditions and business modalities may vary from region to region, so that the outcome of any optimization effort may vary, too.

To evaluate that, this paper will discuss the performance of an OR-based software planning tool in four different European countries. For this purpose, case studies spanning four business days each were conducted. The results of these case studies are going to be discussed by comparing the planning quality of manual created transportation plans versus plans that were created by the software applying OR methods. The objective of this paper is to better understand what factors contribute to a good transportation performance and to identify best practices for improvement which may vary when looking at the different markets in the case studies.

Our results show that transportation planning quality can be increased dramatically by the application of the OR methods regardless of the different market conditions and business rules that apply to the three countries examined in the case studies.

Keywords: Operations Research, OR, algorithms, transport optimization, concrete distribution, vehicle scheduling