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Research Report: ZLC-2008-2
Revenue Management in the Railroad Industry: A Semi-dynamic Solution
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Revenue Management in the Railroad Industry: A Semi-dynamic Solution

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EXECUTIVE SUMMARY

The railroad networks in Europe are heavily supported by governments, which have been primarily focused on the social and economic impact of running a clean, rapid, and affordable mass transportation system, rather than on the profitability of the system itself. Governments provide the funds to invest and maintain the railroad networks, subsidizing the operational costs, even if a financial deficit takes place on the railroad operator's income statement. Western Europe railroad passenger networks move about 5.5 billion passengers per year, and yet earnings are typically close to zero, or in some cases negative, threatening the self-sustainability of the railroad operators.

In the 1970's and 1980's, airlines worldwide faced a similar situation as non-profitable businesses, and many went into bankruptcy. Inspired by that situation, the theory of Revenue Management (RM) was developed, and this innovation helped the airline industry to recover and become profitable again, increasing plane occupation by reaching customers with lower willingness-to-pay. At the same time, it was possible to have better seat allocation among the different available classes and charge customers optimal fares, which increased the revenue per flight.

In the last decade, a number of passenger railroad companies worldwide implemented RM in an attempt to improve their revenues and consequently increase profitability due to the relative success of this process in the airline industry. Some have succeeded and some have not, as a consequence of several factors and shortcomings during the design and implementation process. One key aspect is the difference between airline and railroad network and design, making RM for airlines not entirely applicable to railroad companies.

This thesis provides tools for successful design and insights for adequate implementation of RM in any railroad company, by using actual data from a European railroad company, which currently has not implemented a full RM system. The research delivers the following information:

- **Building a Semi-dynamic RM Model:** For one particular High Speed Train route between two major urban centers, the Semi-dynamic approach is the result of calculating a static RM model discretely in time, before a given train departure.

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- **Forecasting Passenger Demand:** Forecast aggregation is performed at individual train level by understanding customer preferences from historically available data and estimating the impact after RM implementation.

- **Establishing a Booking Control Policy:** The optimal policy is the result of simulating different scenarios and their expected revenues and comparing them with the actual ones, taking into consideration changes and cancellations.

Implementation is a sensitive issue in any RM project, but it is not the main area of attention for this research. Nonetheless, some advice and insights as a result of documented best practice experiences in the airline and railroad industries is provided.

The railroad company, which was the source of the actual data, is currently taking steps to implement an RM system and has made some progress during the elaboration of this research. Unfortunately, there are no data yet to analyze the impact of what has been implemented so far.