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Category: **Rail**   Country: **Italy**

Research Area 3: **Automation and Robotisation**   Idea Number: **7**

An optimisation framework for implementing energy-saving strategies in a passenger-oriented perspective

The proposed research aims at providing a Decision Support System (DSS) for optimising railway dispatching activities, both at planning and operational stage. Specifically, the maximisation of railway energy efficiency is pursued. However, the operational perspective is combined with a passenger-centric evaluation, thus providing an exhaustive analysis. For this purpose, an accurate modelling of railway service and related interactions with travel demand and energy domain is required. In particular, the adoption of energy-efficient speed profiles, while reducing the consumption of energy, also provides an increase in train running times. This has two consequences: i) the increased running times need to be compensated by specific time aliquots properly scheduled and allocated in the timetable, to avoid compromising rail operation stability; ii) the passenger travel times also increase, and therefore an accurate evaluation of the trade-off between the reduction in energy consumption and the increase in passengers' discomfort is required. In addition, given the high vulnerability of railway operations to system failure, the proposed research also focuses on rescheduling strategies which are aimed at re-establishing ordinary service conditions as soon as possible, minimising side effects both on operations and users' satisfaction. A comprehensive methodological structure has been developed to implement the proposed DSS on a practical basis. This methodological framework combines ad-hoc simulation techniques and optimisation tools specifically developed to determine the best trade-off between railway energy efficiency and operational stability, and passengers' comfort.

Key Characteristics
Decision Support System · Railway service modelling