Capacity Utilization in European Railways: Who is the fairest of them all?

At the strategic level, railways currently use different indices to estimate how ‘value’ is generated by using railway capacity. However, railway capacity is a multidisciplinary area, and attempts to develop various indices cannot provide a holistic measure of operational efficiency. European railways are facing a capacity challenge which is caused by passenger and freight demand exceeding the track capacity supply. In the absence of a comprehensive railway capacity manual, methodologies are needed to assess how well railways use their track capacity. This paper presents a novel and unprecedented approach for this aim. Relative operational efficiency of 24 European railways in capacity utilization is studied for the first time by data envelopment analysis (DEA). It deviates from previous applications of DEA in the railway industry that are conducted to analyze cost efficiency of railways. Six DEA models quantify various aspects of micro, macro and quality of railway capacity utilization in these countries. New inputs like gross domestic product, population and area of the country help to provide a better picture of the status of railways. Passenger satisfaction data about different aspects of railway services in European countries has recently been quantified by European commission and are used for the first time in the literature. Invaluable insights can be inferred from the results which can provide a ground basis for railway practitioners and policy makers.