Profit-Generating Capacity for a Freight Railroad

In the face of enormous and continuously growing demand but limited infrastructure, railroads worldwide are struggling with the capacity challenge. As expansion projects are time consuming and capital intensive, existing infrastructure should be used as efficiently as possible. Different categories of metrics exist for measuring how well the infrastructure is utilized including throughput (trains, tons, cars, train-km, ton-km), level of service (terminal dwell, velocity, delays) and asset utilisation (velocity, occupation time of infrastructure). However, current metrics cannot provide enough clues for the railroad authorities to choose the best combination of heterogeneous traffic. Different combinations of traffic incur different costs, revenue, delays and capacity utilisation. This article studies the new concept of profit-generating capacity and introduces a novel approach to measure capacity utilisation by means of profit. It would bring capacity analysis in line with the operational goal of railroads and enable considering different values of trains, seeing the big picture and more efficient decision making for getting the maximum value. A case study for heterogeneous traffic of bulk and intermodal trains is simulated by Rail Traffic Controller (RTC) for various traffic levels (8 to 48 trains a day) and incremental levels of heterogeneity (0% percent of bulk trains to 100%). The early results of studying this new concept are presented and discussed.