TOP TEN

Jan-Rasmus Künnen
Otto Beishem School of Management - WHU

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Rethinking air traffic capacity management to reduce emissions and improve resilience

With the surge in demand after the lows during the COVID-19 heights, the air traffic capacity problems (particularly at peak times) have rebounded to pre-pandemic levels, witnessed by long queues at airports and flight delays. One reason for the observed demand-capacity imbalances is that even today, all European air navigation service providers make local, autonomous decisions on how much air traffic controller capacity to provide on a certain day, without considering the network effects on other air navigation service providers. Failing to information on capacity not only leads to flight delays, but also to re-routings of flights to avoid congested airspace. In fact, a better capacity allocation for air traffic services in Europe may save 10-20% fuel (and emissions) from flight re-routings. As a remedy, the project proposes a centrally coordinated capacity planning on a European-wide level which considers both network effects and emissions in making capacity decisions. This may not only improve network performance and reduce flight emissions through available capacities, but also provide the basis for capacity flexibilization via capacity sharing. The research contributes to a capacity planning tool (based on simulation optimization) that structurally evaluates capacity decisions in terms of delay and re-routing costs, as well as emissions, and allows to determine the number of controllers that should be trained for capacity sharing. Current capacity planning models do not share these properties. In this study, it is found that these central capacity decisions can reduce emissions from re-routings by 45%, and that capacity sharing can reduce them by another 17%.