

## **Abstract**

Many of the world's air transportation systems are failing to deliver on the reliable (on-time) operation of flight schedules that accommodate passengers when they want to fly, with minimum total transportation time. Evidence of this is apparent in trends of flight and passenger delays, flight service frequencies, and total origin-destination travel times. A major cause of this service failure is misalignment of demand and capacity in today's aviation systems.

There are periods when the numbers of scheduled flight operations exceed capacities, and periods when both unused capacity and unmet demand exist simultaneously. The result is high levels of delay, limitations on service expansion, and significant negative impacts to passengers and to airlines.

Realignment of demand and capacity through the addition of capacity is not a viable option in much of the world. Instead, the challenge is to achieve realignment through capacity and demand management approaches that better utilize existing capacity. Major research questions are associated with: 1) defining system capacity; 2) allocating system capacity with administrative and market mechanisms; and 3) designing, pricing and operating airline schedules to satisfy dynamic capacity allocations.

Focusing on demand and capacity management challenges that arise in the context of both planning and operations, we provide an overview of research accomplishments and future research opportunities to improve the reliability and performance of air transportation systems.