Abstract

Sustainability has become a key topic in transportation in the last decades where the aim is to reduce the impact of transportation on the environment. One of the most important paths toward sustainability in this sector is to optimize transportation operations required in several dimensions to fulfill a given transport demand. To achieve this goal in the context of multimodal transport, there is a clear need for flexibility in capacity. This flexibility is adequately provided by a new concept developed at EPFL, named Clip-Air, for air transport. Clip-Air is a modular innovative aircraft with detachable load units which enable to adjust at best capacity according to demand. The decoupling of the load (capsules) and carrying units (wings) allows for simplified fleet management and maintenance operations for airlines and is expected to improve the ground operations for airports. Clip-Air also provides effective possibility of combining commercial freight and passengers on the same flight without any compromise in comfort. Besides, Clip-Air is designed to operate in a multi-modal context and is expected to improve the multi-modality concept by allowing a better integration between air transport and other transport modes. The objective of this research is to assess the actual impact of Clip-Air’s modularity on demand satisfaction, operational costs and environmental issues at the system level. The contributions will consist of models and algorithms designed to perform comparative analysis of operations of airlines and airports in various scenarios.