System dynamics model for airport characterization in hub-and-spoke networks

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Abstrak

Global revenue by passenger kilometers over the last ten years has grown at an average of 4.7 percent per year. The high growth of air transport must be offset by equivalent airport investment: perhaps even a doubling of the percentage growth of numbers of passengers. The purpose of this paper is to build a development model for investment in hub-and-spoke airport networks. The methodology developed in this paper uses systems dynamics theory. The benefit of using this approach is that the variables in the model are determined through a systems thinking process; the determination of variables through such a thinking process considers causality between variables dynamically, logically, and realistically within a complex aviation industry system. The simulation model shows that using a system dynamics approach can be used to simulate airport infrastructure investment development in a hub-and-spoke network. One of the subsystems is congestion; the result of simulation of this subsystem yields the behavioral characteristics, which show that a surge in demand (which is then offset by the provision of capacity or capacity enlargement) will eventually become stable, indicated by a lack of lines on the runway side. This means that decreases in congestion will increase passenger demand, and will also enhance potential investment in airport infrastructure.