# Optimasi sistem hub-and-spoke menggunakan algoritma genetika dan aplikasinya pada jaringan penerbangan domestik di Indonesia

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Abstrak

Beginning with the Airline Deregulation Act of 1978 in US, followed by the European Union in 1997, airlines have been constructing route networks of their own choosing rather than operating ones implicitly chosen for them by civil aviation authority. These changes have had profound effects on many aspects of airline operation, particularly fares, service, quality, and safety. But, most importantly, airlines have altered their route structures by developing hub-and-spoke networks, and this has affected all of these aspects. This structure is likely to flourish around the world as a consequence of airline liberalization and the growing trend toward privatization of this industry.

In a hub-and-spoke network, centrally located service facilities serve as the hubs. Flows from a set of outlying nonhub nodes arrive at hubs and, after regrouping, all leave the hub facilities bound either to other hubs or to their ultimate destinations. Thus, the flows from the same origin with different destinations are consolidated on the route to a hub facility and the flows with different origins but the same destination on the route out of a hub facility. The centralization and broader scope of operations let the system take advantage of economies of scale.

This paper proposes a framework to optimize the flight network using hub-and-spoke system. This problem consists of the determination of hub number, hub location and route assignment in order to minimize the overall transportation cost. The model is solved using genetic algorithm approach. Two networking strategies are considered:
1. Strict hubbing, in which a spoke is assigned to exactly one hub and all flows to/from spoke are channeled trough the same hub and
2. Nonstrict hubbing, in which a spoke can be assigned to more than one hub under certain condition.
Different values of airport fixed costs are also implemented. Variations of these strategies are evaluated along with various parameters of air transport production using data on air passenger flows between top 30 Indonesian airports in 2000.

The result shows that the adoption of hub-and-spoke network increase the overall system performance with increasing load factor, frequency, coverage area, revenue passenger kilometer, available seat kilometer and more efficient utilization of aircraft. Moreover, Nonstrict hubbing strategy offers smaller total system cost, more routes and more nonstop flights.