EXPLORING THE EVOLVING STRUCTURE OF THE SOUTHEAST ASIAN AIR TRANSPORT NETWORK DURING 1979-2012

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This paper offers a novel approach to investigate and understand the evolving structure of the Southeast Asian air transport network (SAAN) over the period of 1979-2012. It captures the main topological and spatial changes in the network system from different dimensions of complex network theory, demonstrating a relatively stable topological structure and constantly changing multilayer structure. A statistical analysis indicates that the SAAN is a scale-free network with a decentralization trend in the overall connectivity. It has been characterized with small-world property since 1996 when the characteristic path length was surpassed by that of a same-size random network (RN) while the average clustering coefficient has significantly outstripped the value of the comparable RN all the time. Furthermore, the SAAN shows a more and more explicit disassortative mixing pattern and a growing global efficiency to transport passengers over time. A decomposition analysis encapsulates the SAAN into three layers, i.e., core, bridge and periphery, to give new insights into the multilevel structure in the complex network system. The core layer, containing capital cities of each country, most economic vibrant secondary cities, and famous tourist destinations, is densely connected with a focus moving towards the west half of Southeast Asia. The periphery layer, comprised of cities in remote areas, sustains low significance with decline in internal connections and passengers despite a slight rise in cities. The bridge layer lies in between presents a high volatility over time. The connections and passengers between different layers exhibits an overall increase, especially those between core and bridge after 1996.The changes are generally coupled with a series of socio-economic and political dynamics in Southeast Asia.

Keywords: Complex network; air network; topology; multilayer structure; Southeast Asia

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