عنوان مقاله:

Optimization of Coupling Event in Passenger Transportation Systems of Airports by Axiomatic Design Principles: A unique Metaheuristic-based Approach

محل انتشار:

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خلاصه مقاله:

From principles of Axiomatic Design (AD) theory, any design of an engineering system of interest in which independence among its Functional Requirements (FRs) is preserved can be regarded as a promising design for the system. On the basis of Axiomatic Design (AD) theory, losing independenceamong FRs of the system is referred to as "coupling" event and it may bring about system complexity. However, in most of cases, due to nature of the concerned system, design of systems in which the independence among the FRs is fulfilled may be impossible in practice. In such cases, the present studysuggests overall coupling reduction as a sound solution for reaching a system with relatively lowest complexity. To verify this idea, this study addresses the passenger transportation systems of airports and evaluates degree of coupling among FRs based on two measures Reangularity and Semangularityfor main departments including "Departure Lounge", "Public Hall", "Check in", "Departure Curb I", "Departure Curb II", "Entrance Hall" and "Immigration and Custom" at the first level of system abstraction. To find global minima of coupling for each department, this study utilizes meta-heuristic techniques. Specifically, Genetic Algorithm (GA); Particle Swarm Optimization (PSO); Deferential Evolution (DE); and Firefly Algorithm (FA) are employed. Results of the analyses for the case indicate relative weakness of FA in finding the global minimal to the other three.

کلمات کلیدی:

Axiomatic Design (AD) Theory, Coupling Event, Genetic Algorithm (GA), Particle Swarm Optimization (PSO), Deferential Evolution (DE), Firefly Algorithm (FA).

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