Differential Evolution for Hotel Chambermaid Scheduling Problem

Nutnicha Imnamkhao[1,a] **Kanchana Sethanan**[2,b,*], and **Thitipong Jamrus**[2,c]

[1] Graduate student, Department of Industrial Engineering, Faculty of Engineering, Khon Kaen University, Khon Kaen, Thailand
[2] Department of Industrial Engineering, Faculty of Engineering, Khon Kaen University, Khon Kaen, Thailand

E-mail: [a]nutnicha.imn@kkumail.com, [b,*]skanch@kku.ac.th (Corresponding author),
[c]thitja@kku.ac.th

Abstract. This research focuses on the hotel chambermaid scheduling problem. Such a problem is the uniform parallel housekeeping operations scheduling problem with consideration of sequence dependent setup time and room time windows, Qm | Sj, rj, dj | ∑cost. This research aims to minimize the total labor costs of chambermaids from the cleaning schedule; the total labor costs consist of the sum of the fixed costs of full-time chambermaids and the variable costs of part-time chambermaids for each day. A mixed integer linear programming (MILP) model has been developed to find an optimal solution for small-sized problems, and this research presents two algorithms: 1) constructive heuristics and 2) differential evolution (DE) to find a near-optimal solution for large-sized problems. The results showed that, in small problem instances, both constructive heuristics and DE provide near-optimal solutions from the MILP, with the average percentage of heuristic performance being 96.73% and 99.11%, respectively. In medium and large problem instances, DE presents the best solutions compared with constructive heuristics, with the average percentage of relative improvement being 6.10%. However, the proposed algorithms can solve the scheduling problem efficiently within the accepted computational time for the hotel industry.

Keywords: Hotel industry, Chambermaid scheduling, Mathematical model, Differential evolution