Abstract:
The sustainability of manufacturing systems is not thoroughly investigated in the existing literature despite that fact that it affects service-oriented organisations. This paper addresses this gap by incorporating the criterion of energy consumption in mixed model assembly line sequencing (MMALS) to explore the potential for energy saving. Energy consumption was integrated with makespan and sequence dependent setup time of mixed models to achieve the sustainability in sequencing. A mathematical model was developed for the optimisation of energy efficient MMAL (EEMMAL). The multi-objective intelligent genetic algorithm (MOIGA) was proposed for minimisation of three conflicting objectives. A case study was conducted using centrifugal pump assembly line to test the performance of proposed MOIGA and the results were compared with those obtained from multi-objective genetic algorithm (MOGA). Finally, a trade-off analysis was conducted between total setup time, makespan (a service level measure on shop floor) and energy consumption (a factor of environmental sustainability). This analysis indicated the effectiveness of MOIGA (compared to MOGA) for EEMMALS problems.

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