ABSTRACT

OPTIMIZATION OF JOB SHOP SCHEDULING USING GENETIC ALGORITHM AND CAMPBELL DUDEK SMITH ALGORITHM

By

Valens Alvaro Sidabalok

Optimization of production scheduling is essential to improve the efficiency of manufacturing systems, particularly in minimizing makespan. This study aims to minimize the makespan in a Job Shop Scheduling Problem (7 jobs, 7 machines) at PT Acosys Global Data, Bandar Lampung, using the Genetic Algorithm and the Campbell Dudek Smith (CDS) Algorithm. The Genetic Algorithm was applied through population initialization, fitness evaluation, selection, crossover, and mutation, while the CDS Algorithm utilized the formation of dummy machines and Johnson's rule. The results showed that the Genetic Algorithm produced the best job sequence [6,4,5,3,1,2,7] with a makespan of 546 minutes, outperforming the CDS Algorithm, which yielded a makespan of 560 minutes with the best job sequence [6,7,2,4,5,1,3]. In conclusion, the Genetic Algorithm is more optimal than the CDS Algorithm in minimizing makespan in a job shop production system

Keywords: Job Shop Scheduling Problem, makespan, Genetic Algorithm, Campbell Dudek Smith

ABSTRAK

OPTIMALISASI PENJADWALAN *JOB SHOP* MENGGUNAKAN ALGORITMA GENETIKA DAN ALGORITMA *CAMPBELL DUDEK SMITH*

Oleh

Valens Alvaro Sidabalok

Optimalisasi penjadwalan produksi sangat diperlukan untuk meningkatkan efisiensi sistem manufaktur terutama dalam meminimalkan *makespan*. penelitian ini bertujuan untuk meminimalkan *makespan* pada *Job Shop Scheduling Problem* (7 job, 7 mesin) di PT Acosys Global Data Bandar Lampung menggunakan Algoritma Genetika dan Algoritma Campbell Dudek Smith (CDS). Algoritma Genetika diterapkan melalui inisialisasi populasi, evaluasi *fitness*, seleksi, *crossover*, dan mutasi, sedangkan Algoritma CDS menggunakan pembentukan mesin semu dan aturan Johnson. Hasil penelitian menunjukkan Algoritma Genetika menghasilkan urutan *job* terbaik [6,4,5,3,1,2,7] dengan *makespan* 546 menit, lebih baik dibandingkan Algoritma CDS yang menghasilkan makespan 560 menit dengan urutan *job* terbaik [6,7,2,4,5,1,3]. Kesimpulannya, Algoritma Genetika lebih optimal daripada Algoritma CDS dalam meminimalkan *makespan* pada sistem produksi *job shop*.

Kata-kata kunci: JSSP, makespan, Algoritma Genetika, CDS