ABSTRAK

Quadratic Assignment Problem (QAP) merupakan masalah optimasi kombinatorial. QAP seringkali dijumpai pada masalah tata letak fasilitas. Tata letak fasilitas merupakan masalah menugaskan *n* fasilitas ke *n* lokasi sehingga dapat meminimalkan biaya total penugasan. Aplikasi QAP yang diteliti pada skripsi ini adalah tata letak fasilitas produksi di PT. Slamet Langgeng. Pencarian solusi QAP menggunakan algoritma *Ant System* dengan mengkaji tiga algoritma pembaruan *pheromone* yaitu algoritma *Ant Cycle*, *Ant Density* dan *Ant Quantity*. Simulasi ketiga algoritma tersebut dalam penyelesaian QAP menggunakan bantuan *software* Matlab 7.0.4.

Berdasarkan hasil simulasi penyelesaian QAP, solusi QAP terbaik yang ditawarkan algoritma *Ant Cycle*, *Ant Density* dan *Ant Quantity* menghasilkan jarak minimum yang berbeda-beda. Solusi QAP terbaik dengan jarak minimum terkecil ditawarkan algoritma *Ant Cycle* sebesar 4.967,2 m selama 1.000 iterasi. Solusi QAP tersebut memiliki jarak minimum yang sama dengan jarak optimal sebesar 4.967,2 m sehingga tata letak fasilitas produksi di PT. Slamet Langgeng tahun 2019 sudah optimal dalam hal jarak perjalanan tenaga kerja antarproses produksi. Algoritma *Ant Density* menghasilkan solusi QAP terbaik sebesar 5.271,4 m selama 2.000 iterasi. Algoritma *Ant Quantity* menghasilkan solusi QAP terbaik sebesar 5.471,6 m selama 500 iterasi.

Kata kunci: *Ant Cycle*, *Ant Density*, *Ant Quantity*, PT. Slamet Langgeng dan QAP

ABSTRACT

Quadratic Assignment Problem (QAP) is a combinatorial optimization problem. QAP is often encountered with facility layout issues. Facility layout is a matter of assigning n facilities to n locations to minimize the total cost of the assignment. The QAP application examined in this thesis is the layout of the production facilities at PT. Slamet Langgeng. The search for QAP solutions uses the Ant System algorithm by examining three pheromone update algorithms, namely the Ant Cycle, Ant Density, and Ant Quantity algorithms. The simulation of the three algorithms in the completion of QAP uses the help of Matlab 7.0.4 software.

Based on the results of the QAP completion simulation, the best QAP solution offered by the Ant Cycle, Ant Density, and Ant Quantity algorithms produce different minimum distances. The best QAP solution with the smallest minimum distance is offered by the Ant Cycle algorithm of 4,967.2 m for 1,000 iterations. The QAP solution has the same minimum distance with an optimal distance of 4,967.2 m so that the layout of the production facilities at PT. Slamet Langgeng in 2019 is optimal in terms of the distance of labor between production processes. The Ant Density algorithm produces the best QAP solution of 5,271.4 m for 2,000 iterations. The Ant Quantity algorithm produces the best QAP solution of 5,471.6 m for 500 iterations.

Keywords: Ant Cycle, Ant Density, Ant Quantity, PT. Slamet Langgeng and QAP