

ABSTRACT

PT XYZ is a garment company that produces various types of clothing such as t-shirts, shirts and hoodies. In producing these products, PT XYZ applies the flow shop production process flow. The company pays attention to opportunities to increase production demand both domestically and abroad. However, this raises problems in meeting buyer demand, therefore identification is carried out regarding the root causes of the problem of delays in the production completion process with a fishbone diagram. Based on the identification process, it is known that PT XYZ does not have good production planning in the form of production scheduling that can handle complex production processes. The production scheduling used by PT XYZ is indicated to be based on First Come First Served (FCFS). The scheduling used by PT XYZ was unable to meet the deadline for each job and resulted in a delay in production completion of 52% of the total 25 jobs undertaken by the company from August to November 2023. In addition to not being able to meet the deadline given by the buyer, the scheduling used by the company cannot prioritize the priority work of PT XYZ, namely export orders. Export products have privileges in the form of fines that are more expensive than local products when the company is late in completing the production of export products. The proposal made to reduce the delay in product completion of PT XYZ is the design of flow shop production scheduling using a combination of Ant Colony Optimization Algorithm and Tabu Search Algorithm (ACO-TS) methods. In this combination of methods Ant Colony Optimization moves as the main body of the algorithm and Tabu search as a local search in the algorithm. Ant colony optimization algorithm aims to get an initial solution through simulating the behavior of ants that are looking for the smallest total delay in this Final Project. Then, Tabu Search is useful to ensure that the solution search does not get stuck in the local optimal solution by improving the solution to be better through the swapping process.. Based on the results of running using MATLAB, it is found that the proposed scheduling with the ACO-TS method shows a total tardiness of 5 days. This indicates that the proposed method design is able to reduce the total tardiness by 88.08%. In addition, the design is able to fulfill the company's wishes in the form of prioritizing export products over other products.

Keywords: Garment, Flow shop, Ant Colony Optimization Algorithm, Taboo Search Algorithm, Total Tardiness