

# A COMPARISON OF HEURISTICS FOR SCHEDULING PROBLEMS IN TEXTILE INDUSTRY

Cecilia E. Nugraheni\*, Luciana Abednego

Dept. of Informatics, Parahyangan Catholic University, Bandung, Indonesia

## Article history

Received

15 July 2015

Received in revised form

18 October 2015

Accepted

19 January 2016

\*Corresponding author  
cheni@unpar.ac.id

## Graphical abstract

| Job j | Machine |   |   |   |   |
|-------|---------|---|---|---|---|
|       | 1       | 2 | 3 | 4 | 5 |
| tj1   | 6       | 4 | 3 | 9 | 5 |
| tj2   | 8       | 1 | 9 | 5 | 6 |
| tj3   | 2       | 1 | 5 | 8 | 6 |

## Abstract

Scheduling is an important problem in textile industry. The scheduling problem in textile industry generally belongs to the flow shop scheduling problem (FSSP). There are many heuristics for solving this problem. Eight heuristics, namely FCFS, Gupta, Palmer, NEH, CDS, Dannenbring, Pour, and MOD are considered and compared. Experimental results show the best heuristic is NEH and the worst heuristic is FCFS.

Keywords: Textile industry, scheduling, flow shop scheduling problem, heuristics

© 2016 Penerbit UTM Press. All rights reserved

## 1.0 INTRODUCTION

In the area of textile industry, there are two basic kinds of industry, which are textile industry and apparel industry [1]. Textile industry is industry that handles the manufacturing of fibers by fiber industry, forming, dressing and coloring of fabric; whereas apparel industry is industry that produces ready-to-wear garments.

There are two important problems faced by the Indonesia's textile industry. The first problem is the entry of products from foreigner countries. The second problem is the condition of production machines. The relatively old machines will not only consume a large amount of energy, but also affect the optimality of working speed and the quality of products.

Scheduling is understood as assigning jobs to machines or human (such as operators) for specified time period satisfying some constraints. Scheduling has become an important problem in textile industry. Generally, scheduling problems found in textile industry can be classified into flow shop scheduling problem (FSSP). Given  $m$  machines and  $n$  jobs that will be processed on each machine, an FSSP is the problem to find a sequence of jobs that meets some particular criteria. One of the important objectives is to find the minimum makespan. Makespan is the time between the beginning of the execution of the first job of the

sequence on the first machine and the completion of the execution of the last job of the sequence on the last machine.

FSSP is a popular topic that attracts many researchers. Many methods or heuristics for solving this class of problems have been proposed. In general, those heuristics can be classified into two types: constructive or improvement heuristics [2-3]. Some examples of constructive heuristics are Johnson, Gupta, Palmer, NEH, CDS algorithms, whereas some examples of improvement heuristics are genetic algorithms, simulated annealing, and tabu search [4].

Each heuristic has strengths as well as weaknesses. There is some approach for combining heuristics in order to obtain some new better heuristics. One of the approaches is hyper-heuristic. We are interested in developing a hyper-heuristics framework that can be used to solve FSSP. For a start, we study nine basic heuristics for FSSP, namely FCFS, Johnson, Gupta, Palmer, NEH, CDS, Dannenbring, Pour, and MOD algorithm. We have implemented those heuristics in a computer program and tested on some small case studies related to scheduling problem in textile industry [5].

This work is a continuation of our previous work. The goal of this work is to investigate and to compare the performance of each heuristic in solving more complex problems. Using our program, we conducted an experiment again. Differs from [5], instead of using