## ABSTRACT

## IMPLEMENTATION OF GENETIC ALGORITHM (GA) WITH PENALTY STRATEGY FOR KNAPSACK PROBLEM

**By**

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Optimization problems have many function in a real life, such as for select investments, for determine the distribution of goods and for determine the picket schedules in the hospitals, etc. Investment issues are included into the knapsack problem. Knapsack problem is a combinatorial optimization problem that belongs to the NP-Hard problem. Some of conventional methods have been reported to solve it. However several methods are still very hard to get an optimal solution with a relatively quick time, because the knapsack problem belongs to the NP-hard problem. Therefore, in this paper we developed a model of GA as heuristics method to solve knapsack.

GA is an algorithm developed similar to the natural evolutionary process. Stages at the GA include initialitation, evaluation, crossover, mutation and selection. The initialization process was done by two types of generate candidate solutions. The first, generating of candicate solution directly on the feasible space (directed GA). The second, generating of candidate solution randomly (randomly GA). Penalty strategy as a method for evaluating the candidate solution and handling constraint will be focus on this research. Experiment was done by using test problems given in the literature. Based on the experiments, penalty strategy with the directed GA is better suited than the randomly GA.



***Keywords*** **:** *Genetic Algorithm (GA), Knapsack Problem (KP), Penalty Strategy.*