THE DEVELOPMENT OF HYBRID CROSS ENTROPY-GENETIC ALGORITHM FOR MULTI-PRODUCT INVENTORY SHIP ROUTING PROBLEM WITH HETEROGENEOUS FLEET

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ABSTRACT
This research develops multi-product inventory ship routing problem with heterogeneous fleet. ISRP is a problem that combines inventory level management in every unloading port and the routing process of the ship. This problem considers some different things, those are the weight of ships that can be moored in port, product compatibility, port setup and compartment washing. The objective functions of this problem are minimizing travelling cost, port setup cost, ship charter cost, and compartment washing cost. There will be a stage to choose ships in order to obey the constraint that forbids some ships moored in some ports. This process also makes sure that the minimum cost will be reached. Besides choosing the ship, this research also finds the best product allocation, the best route for every ships and the best shipping quantity. Moreover, ISRP is one of NP hard problem. The solution of this problem needs a high computation time regarding to the complexity of the problem. Therefore, this research develops metaheuristic method by hybridizing Cross Entropy and Genetic Algorithm. Cross Entropy is chosen because this algorithm can solve NP hard problem well and easy to apply in combinatorial problem. However, this algorithm needs a high computation time to create a new sample. Due to this lack, CE will be hybridized with GA in order to get new samples fast by mutation step. This research also performs another method to compare the performance of hybrid CEGA. The solution of CEGA is evaluated by comparing them to the output that hybrid Tabu Search has. The outcomes show that CEGA gives better solution but the computation time is longer than hybrid TS.

Keywords: multi-product, inventory ship routing problem, heterogeneous fleet, Cross Entropy-Genetic Algorithm.