LOGISTIC PLANNING BY GENETIC ALGORITHM WITH BENDER DECOMPOSITION FOR RICE DISTRIBUTION – A CASE OF BULOG AGENCY IN THE NGANJUK DISTRICT OF INDONESIA

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ABSTRACT

The Bureau of Logistics (Indonesian: Badan Urusan Logistik/BULOG) is a government-owned company in Indonesia which deals with food distribution and price control. This study addresses a vehicle routing problem with time windows encountered by BULOG in the Nganjuk district of East Java, Indonesia. A mixed-integer programming model and corresponding genetic algorithm (GA) is proposed to resolve the delivery plan of rice from a central BULOG through warehouses and sub-districts to poor villages in Nganjuk. The proposed GA is empowered by Bender decomposition (BD) as a solver to minimize the total cost of distribution, while remains timely delivery and fulfills the vehicle fleet capacity. An exact VRPTW permutation, VRPTW with BD, naïve GA and a GA-BD, are used as the benchmarks to compare the efficiency of our proposed algorithm. The best route is presented in Web-GIS to facilitate BULOG’s decision as planning their rice distribution.

Keywords: Bender decomposition, genetic algorithm, time windows, vehicle routing planning.