Supanat Suwansuksamran 2014: Mixed Integer Programming for a Vehicle Routing Problem with Time Windows in Agro-Industry. Master of Science (Agro-Industrial Technology Management), Major Field: Agro-Industrial Technology Management, Department of Agro-Industrial Technology. Thesis Advisor: Assistant Professor Pornthipa Ongkunaruk, Ph.D. 102 pages.

Vehicle Routing Problem with Time Windows (VRPTW) is to determine the best route to transport from raw materials or product from point to point so that the total cost is minimized while fulfill the time windows constraint. There are many requirements in this problem such as truck capacity, demand for product, supply quantities, and time windows from transportation law in Bangkok and metropolitan or perishability of raw material. This research aims to solve vehicle routing with time windows to reduce transportation costs. There are 2 types of VRPTW problems i.e. to delivery of products and to pick up raw materials with time window constraint. In agro-industry, we found two case studies that were good representatives of VRPTW. The first case study was to deliver the product to customers located in Bangkok and metropolitan with restrictions of banning the trucks running during rush hour. Another case study was the problem of pick up raw materials from coconut farmers to a manufacturer with limited time since a raw material would be perishable if the transit time was more than four hours. Then, we proposed a Mixed Integer Programming to solve VRPTW for two cases. The first model was a special variant of the model to solve similar VRPTW problems by replacement time windows to the number of group customers that can be included in the route. The second model applied the maximum time to pick up a raw material. Next, we solved the problems by IBM ILOG CPLEX Optimization Studio version 12.4. The results showed that our models can reduce pickup and delivery planning time while reduce cost compared to the current method.

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