

# An integrated replenishment model for the bike industry

李欣怡, 康鹤耀, Wan-Yu Wu

Technology Management

Management

amylee@chu.edu.tw

## Abstract

After more than forty years of development, the bike industry in Taiwan has become number one in the world, with several well-known world-leading international brands. The competitiveness of the bike industry is due to the advantages of cost, quality, flexibility, expertise in manufacturing technology, and a complete supply chain. How to manufacture bikes that customers demand with a lower cost and higher quality is important for manufacturers to maintain their competitive edges and to earn a good share of profit in the long run. In devising an appropriate supply chain decision making policy, a production manager needs to consider multiple suppliers, transportation batch and quantity discounts. In this paper, a mixed integer linear programming (MILP) model is constructed first. The objective is to minimize total costs, which include ordering cost, purchase cost, transportation cost, production cost, holding cost and shortage cost. Next, enhanced genetic algorithm (EGA) is applied to solve a complicated problem, which may be too difficult to be solved by the MILP. This is due to the attribute of the EGA to find near optimal solutions in a short computational time. Since the EGA model can be very effective in searching for solutions, it can be very useful for inventory replenishment decisions in real practice. Finally, a case study of a bike manufacturer is presented to examine the practicality of the models.

Keyword : mixed integer linear programming (MILP), enhanced genetic algorithm (EGA), bike industry