

## On the Economic Lot Scheduling Problem with Fuzzy Demands

Ming-Jong Yao<sup>\*</sup>, Ping-Teng Chang, and Shih-Fen Huang

Department of Industrial Engineering and Enterprise Information, Box 985, Tunghai University, Taichung 407, Taiwan

---

**Abstract**—In this paper, we investigate the economic lot scheduling problem (*ELSP*) with fuzzy demands. We assume that the demand for each product  $i$  can be approximated using some triangular membership functions. In this study, we solve the fuzzy *ELSP* using two basic solution approaches, namely, the Independent Solution (*IS*) and the Common Cycle (*CC*) approach. For both approaches, we derive the optimal fuzzy replenishment cycles and secure closed-form formula for their crisp figures in fuzzy sense, respectively. Also, we derive the conditions that assert the *CC* approach to secure the optimal solution for the fuzzy *ELSP* in many realistic situations. For the cases that deviate from those optimal-situations, we give an upper bound for the maximum error of the solution of the *CC* approach from optimality. A 10-product example demonstrates how to secure the solutions for the *IS* and the *CC* approach for the fuzzy *ELSP*, and illustrates the error bound of the *CC* approach.

**Keywords**—Inventory, Economic lot size scheduling, Fuzzy sets, Fuzzy replenishment cycle, Sensitivity analysis

---

---

<sup>\*</sup> Corresponding author's e-mail: myao@ie.thu.edu.tw