

NETWORK DESIGN FOR STRATEGIC ALLIANCE IN EXPRESS COURIER SERVICES: A FUZZY SET APPROACH

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ABSTRACT. *Since the 1990s, the demand for the direct shipment of purchased goods by express couriers has increased due to an upsurge in e-tailing, telemarketing and IPTV home-shopping. This development has led to the proliferation of express courier companies during the past two decades. As a result, the courier service industry has been characterized by an increase in the number of facilities and delivery vehicles, severe competition particularly among small and medium enterprises (SMEs), and inefficient use of national resources. Furthermore, it is often the case that the operation of facilities and delivery vehicles owned by individual companies are characterized by low rates of utilization. Hence, it has been suggested that cooperative strategic alliances in the operation of facilities and delivery vehicles may benefit participating companies, especially the SMEs. Such a strategic alliance may help these companies overcome their financial challenges and improve their declining profitability, by reducing the total operating cost and eliminating overlapped investments. This study proposes a network design model for strategic alliances among small and medium size express courier service companies that places the companies in a win-win alliance relationship. An integer programming model and its solution procedure based on a fuzzy set theoretic approach are also developed. To illustrate the relevance and efficiency of the model, we have presented a numerical example of the model using randomly generated data representing real world operation situation.*

Keywords: Strategic alliance, Express courier service network, Service center, SME, Fuzzy set approach

1. **Introduction.** According to Forrester Research, online retail sales in 2007 reached \$175 billion, despite the dot-com bubble; representing a 21% increase over \$144.6 billion in 2006. Furthermore, it has been estimated that the total online retail sales in the U.S.A will grow from \$204 billion in 2008 to \$335 billion in 2012 (Mulpuru, 2008). This phenomenal growth in retail sales is particularly associated with busy holiday seasons, when more shoppers order items online and pick them at their homes' doorsteps or nearby stores (Swartz, 2002). The demand for the direct shipment of purchased goods by couriers will be increasing more than ever as a result of an explosive growth in e-tailing, telemarketing, and IPTV home shopping. Even though factors such as economic prosperity and growth of online business activity drive the express courier market, increased competition resulting from deregulation and globalization has made today's express courier industry extremely