

# A fuzzy goal programming with mixed 0-1 integer model approach for color filter inventory management in TFT-LCD manufacturing

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## Abstract

The progress in high technology and the public's demand of a variety of high-tech products have led to the widely use of thin film transistor-liquid crystal display (TFT-LCD). Because of their low weight, slender profile, low power consumption, high resolution, high brightness and low radiance advantages, TFT-LCDs have been expanding from portable appliances, such as personal digital assistants (PDA)s to notebooks and desktop monitors and even to large screen digital televisions. The evolution of the manufacturing technology of TFT-LCD keeps increasing the size of TFT-LCD. However, as the size of TFT-LCD increases, the size of TFT-array substrates and color filter substrates has to increase simultaneously. This leads to a more complicated inventory problem of large-sized substrates. Being one of the most expensive raw materials, color filters substrates are usually purchased from color filter manufacturers, and sufficient amount of them must be available in the plant to maintain a smooth production flow. Thus, this research considers a color filter replenishment problem in TFT-LCD manufacturing with the consideration of batch size, storage space and quantity discounts. The color filter inventory problem is formulated into a fuzzy goal programming with mixed 0-1 integer model, with the objectives of minimizing total cost, maximizing service level and fixing the replenishments to a desired number. The practicality of the model is examined through an example with four cases. The proposed model is recommended for inventory management of color filters for multi-periods, and can be applied or modified for managing inventory in general.

Keyword : fuzzy goal programming; mixed 0-1 integer; TFT-LCD; service level; replenishment; color filter