A Fuzzy Programming Approach for Demand-Driven Requirements Planning

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Abstract

Past surveys on dynamic requirements planning problems assumes that the predicted demands fulfilled completely. In this paper, we tailored a kind of a demand- driven requirements- planning models that is Multiple Price- Demand and Production Cost. It perfectly decides the demands level satisfy to maximize profit and considers any capacitated RPP with multiple demand curve and piecewise- linear and concave revenue (PLC) production costs in a period. Since most of the parameters in such a problem have imprecise nature, a fuzzy programming approach is used to extend this model. To solve the proposed models, a combination solution approach is used. Finally, the proposed approach is validated through several numerical examples and results are reported.

Keywords; Fuzzy programming, Marketing, Pricing, Inventory, Production

1- Introduction

In today's highly competitive environment and market globalization, companies around the world are working on developing requirements planning that can quickly respond to customer needs. Firms that produce make to order goods often make pricing decisions, in addition to planning the production required to satisfy demands. Such pricing decisions are typically made before establishing future production plans and are in many cases made based on the judgment of sales and marketing personnel. This result that do not account for the interaction between pricing decisions and production requirements, and how these factors affect overall profitability. Past operations- modeling literature has not fully addressed integrated pricing and production- planning decisions in make to order systems with the types of non-linear production cost structure often found in practice as a result of production economies of scale. Therefore, we extended one of these kinds of model which fill this gap in order to achieve real and general model.

In the real life, most of the input data and related parameters are not known with certainty because of incompleteness and/or unavailability of required data over amid-term planning horizon and often the decision maker (DM) cannot fit with certainty some probability distribution for uncertain parameters.

The remainder of the paper is outlined as follows. Section 2 reviews briefly the literature of the prioritization problem. Our models are proposed in Section 3. Defuzzification process can be seen in Section 4. Computational Experiment is reported in Section 5 and finally, Section 6 concludes some remarkable findings about the proposed models.

2- Literature Review

In the past, economic order quantity (EOQ) and economic production quantity (EPQ) were treated independently from the viewpoints of the buyer or the vendor. In today's competitive markets, close cooperation between the vendor and the buyer is necessary to reduce the joint inventory cost and the response time of the vendor-buyer system. Various EOQ authors consider a model regarding price-dependent demand and time varying deterioration rate (Sana, 2010), models when the lot size must be an integer quantity (García-Laguna ,2010). Some papers determine lot-size by paying attention to both linear and fixed backorders costs(Cárdenas-Barrón,2011)quality and inventory model, stochastic machine breakdown (Sana and Chaudhuri, 2010), allow for inflation and fluctuating demand (Yang et al.,2001).

Due to the limitation of resources, a firm has to make a strategic decision on which market to enter and allocate resources accordingly (O'Farrell & Wood, 1994). Few studies attempting to integrate product-