

## **Analysis of Two Methods to Estimation Stochastic Demand in the Vehicle Routing Problem**

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**Abstract :** Estimation of stochastic demand in physical distribution in general and efficient transport routes management in particular is emerging as a crucial factor in urban planning domain. It is particularly important in some municipalities such as Tehran where a sound demand management calls for a realistic analysis of the routing system. The methodology involved critically investigating a fuzzy least-squares linear regression approach (FLLRs) to estimate the stochastic demands in the vehicle routing problem (VRP) bearing in mind the customer's preferences order. A FLLR method is proposed in solving the VRP with stochastic demands. Approximate-distance fuzzy least-squares (ADFL) estimator ADFL estimator is applied to original data taken from a case study. The SSR values of the ADFL estimator and real demand are obtained and then compared to SSR values of the nominal demand and real demand. Empirical results showed that the proposed methods can be viable in solving problems under circumstances of having vague and imprecise performance ratings. The results further proved that application of the ADFL was realistic and efficient estimator to face the stochastic demand challenges in vehicle routing system management and solve relevant problems.

**Keywords :** fuzzy least-squares, stochastic, location, routing problems

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