

OPTIMAL PRICING FOR COMPETITIVE SERVICE FACILITIES WITH BALKING AND VEERING CUSTOMERS

ALI PAHLAVANI AND MOHAMMAD SAIDI-MEHRABAD

Department of Industrial Engineering
Iran University of Science and Technology
Narmak, Tehran 16844, Iran
{ pahlavani; mehrabad }@iust.ac.ir

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ABSTRACT. *This paper focuses on determining the optimal pricing strategy for a service providing firm with multiple facilities. The market is involved with some other competing firms providing the same service. The firm and its competitors might devise three different pricing policies as uniform mill pricing, distinct mill pricing and delivered pricing. Customers choose the facilities probabilistically based on their perceived utility to being served. After they received at a congested facility, some of them balk from entering the queue and go directly to another facility rather than coming back to their origins. As a result, the arrival rate for a facility is varying on the level of congestion in all facilities. This situation requires us to find equilibrium point of facilities' arrival rates. For this purpose, a heuristic procedure is developed. The resulted non-linear and complex model is proposed to solve using a hybrid algorithm of Particle Swarm Intelligence and Differential Evolution, two continuous approximate optimization algorithms. An illustrative example is given to show the model's applicability and the algorithm's efficiency. Different scenarios in terms of sensitivity analysis are also mentioned to capture managerial insights.*

Keywords: Price optimization, Competition, Congestion, Balking with veering, Indirect demand capture

1. Introduction. In a competitive market, players should make a set of critical decisions which help them in capturing further demands or purchasing power of customers. For a service providing firm with multiple facilities, along with an appropriate facility location setting [1, 2] and quality improvement, a decision should be made on its services' prices. For this purpose, it is required to understand customers' behavior and their utility factors. It is clear that, congestion in terms of waiting time or occupancy level is an important consideration of quality when a customer decides to buy from a service facility. Each customer might be deterred by the facility's congestion level and might balk upon arrival. Therefore, the effective demand for a facility's service is strictly sensitive to its level of congestion. Clearly, congestion becomes a crucial component of revenue management and it must be especially regarded when the firm determines its pricing policies [3]. The role of congestion is usually disregarded in most part of pricing models. They rely on the common economic intuition that lowering the price increases the demand and vice versa. In more realistic situations, however, pricing strictly affects congestion level. This may exert a different direction to the firm's gains. In particular, once the price is lowered, initially the number of arriving customers will be increased. This will raise the level of congestion such that it becomes unbearable to future customers and probably most of them will be lost. Thus, the really-captured demand would be less than expected. Conversely, once the price is increased, the number of arriving customers will be reduced.