Accepted Manuscript

Equilibrium queueing strategies of two types of customers in a two-server queue

Yanli Tang, Pengfei Guo, Yulan Wang

PII: S0167-6377(17)30324-3
DOI: https://doi.org/10.1016/j.orl.2017.11.009
Reference: OPERES 6305

To appear in: *Operations Research Letters*

Received date : 9 June 2017
Revised date : 15 September 2017
Accepted date : 12 November 2017

Please cite this article as: Y. Tang, P. Guo, Y. Wang, Equilibrium queueing strategies of two types of customers in a two-server queue, *Operations Research Letters* (2017), https://doi.org/10.1016/j.orl.2017.11.009

Equilibrium Queueing Strategies of Two Types of Customers in a Two-Server Queue

Yanli Tang Pengfei Guo Yulan Wang*

Faculty of Business, The Hong Kong Polytechnic University, Hong Kong,
yanli.tang@connect.polyu.hk, pengfei.guo@polyu.edu.hk, yulan.wang@polyu.edu.hk

Abstract

We consider a single queue with two identical servers and two types of customers. The high-type customer is more delay-sensitive but brings less workload to the system than the low-type customer. We obtain the equilibrium queueing strategy for each type of customers.

Keywords: Two types of customers, Strategic queueing behavior, Equilibrium analysis, Two-server queue

1. Introduction

It is commonly observed that a queueing system contains different types of customers. Consider a checkout queue in a retailer store such as a supermarket. Customers can be categorized into two types based on the workload they bring to the server and their delay sensitivity. The high-type customers are often highly delay-sensitive but only checkout a few items, bringing little workload to the queue, whereas the low-type customers are often highly delay-insensitive but checkout many items, bringing heavy workload to the queue. Supermarkets serve these two types of customers either via two separate queues or via a single queue. For example, some supermarkets differentiate the customers who buy less than, say, 5 items from the others and serve these two groups of customers separately via a "fast line" and a "regular" line. In contrast, other supermarkets do not differentiate customers and serve them via a single multi-server queue, regardless of whether they checkout many or a few. Under the former separating case, the checkout system contains two dedicated queues. Customers' strategic queueing behavior can thus be found for each individual queue from the rich literature on queueing strategy; see Hassin and Haviv [1]

*Corresponding author.