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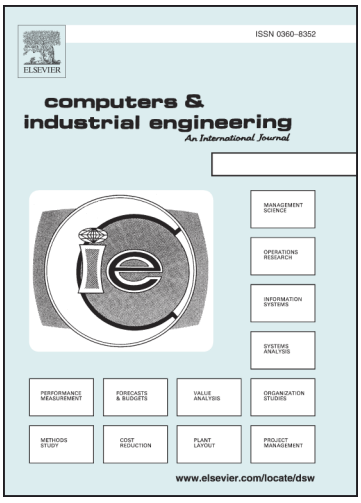

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PII: S0360-8352(17)30479-5
DOI: https://doi.org/10.1016/j.cie.2017.10.011
Reference: CAIE 4948

To appear in: *Computers & Industrial Engineering*

Received Date: 30 October 2016
Revised Date: 5 July 2017
Accepted Date: 10 October 2017

Please cite this article as: Wang, F., Wang, J., George Zhang, Z., Strategic behavior and Social Optimization in a double-ended queue with gated policy, *Computers & Industrial Engineering* (2017), doi: https://doi.org/10.1016/j.cie.2017.10.011

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Strategic behavior and Social Optimization in a double-ended queue with gated policy

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Abstract

This paper is concerned with a double-ended queueing system which is motivated by the passenger-taxi problem under a gated policy. This policy makes taxis start to balk when the taxi queue length reaches an upper limit and to join again when the taxi queue length is reduced to a lower limit. In our model, we focus on the strategic behavior and social optimal strategies of arriving passengers under three information scenarios: (a) unobservable case; (b) almost unobservable case; and (c) observable case. In the unobservable and the almost unobservable cases, we derive the equilibrium joining strategies for arriving passengers and analyze the social welfare optimization problems. In the observable case, we consider the pure threshold-type policies from the perspectives of individual's strategic behavior and the social welfare optimization, respectively. Then, we present some numerical examples to show how the gated policy plays an important role from the social planner's point of view. Some comparisons between our policy with those studied in the literature have been made and some advantages of our policy are demonstrated.

Key words: Double-ended queueing system; gated policy; strategic behavior; individual benefit; social welfare.

1 Introduction

Taking a taxi is one of the main transportation options for travelers at any major airport. However, due to the random demand and supply for this type of service, there may be either

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