THE EFFECTS OF INFORMATION IN TRANSPORTATION SYSTEMS WITH HETEROGENEOUS STRATEGIC CUSTOMERS

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In many transportation systems the service provider is able to obtain information about the expected delays due to congestion and transmit it to customers. Such information affects the behavior of customers and consequently the expected utilities of the customers and the service provider. So, different levels of delay information have different effects on the overall system. We explore these effects considering a transportation system under three levels of delay information: unobservable, partially observable (the queue length is observed) and observable (the exact waiting time is observed).

We consider a transportation station, where customers arrive according to a Poisson process. A transportation facility with unlimited capacity visits the station according to a renewal process and at each visit it serves all present customers. We assume that the arriving customers decide to use the transportation facility or not. A customer who chooses not to use the facility earns no rewards and incurs no costs. A customer who chooses to use it earns a reward upon service completion, pays a service fee, and incurs a waiting cost. Customers have different sensitivity in delays. So, this situation can be considered as a game among heterogeneous customers.

For each level of information, we obtain the equilibrium behavior of the customers. Then, computing and comparing the expected utilities of the customers and the administrator in the three cases depending on the level of information, we conclude which level is preferable for the customers and which is preferable for the service provider. We also explore the effect of customer heterogeneity on their behavior, the utilities and the preferable level of information.