

Dissertation Proposal

Leela Nageswaran

“Innovative Models in Service Operations”

Tuesday, April 19, 2016

12:00 pm

324 GSIA (West Wing)

Many factors, including regulatory changes and the ubiquity of information technology, have spurred the growth of innovative ways of delivering services. As a result, the operations management community has been presented with new challenges. My dissertation seeks to model and provide insights for three such problems in the healthcare and retail industries.

Multiple listing, a policy by which patients awaiting organ transplants are eligible to register at more than one transplant center, has garnered much attention since former Apple CEO Steve Job’s liver transplant. Critics of this policy claim that the wealthy enjoy unfair access to organs at the expense of others, while defenders argue that it could address geographic disparity. Supermarkets with multiple checkout lines exhibit a similar phenomenon when a customer and a companion each join a line, abandoning the “slower” line as soon as either of them reaches the cashier. In the first chapter of my dissertation we model situations such as these using two parallel queues serving two classes of customers, one of which is redundant: a redundant customer joins both queues. We allow for two different settings differentiated by when the redundant jobs are deleted from the system: when the required service is complete, or when it begins. By analyzing different policies that an arriving non-redundant customer may use to join a queue when faced with different levels of system information (e.g., whether the number and/or class of customers present is observable), our model provides fundamental analytical results and insights on the optimal queue joining policy for non-redundant customers, and on the fairness of redundancy.

In the second chapter we study a hospice manager’s problem of managing quality of care in light of recent regulatory changes mandating monitoring and public reporting of nationally endorsed quality metrics. We focus on hospice staffing, a primary determinant of quality, which impacts the reputation of the hospice. We capture how staffing affects both the rate at which patients join the hospice (reputation effects) and the rate at which they depart (quality of care effects). We model the problem as a discrete-time Markov decision process, and obtain properties of the optimal quality control policy. I plan to extend this work by studying the impact of patient arrival and departure rates on quality, and therefore staffing, choices, and the impact of tying reimbursement revenue to quality, as is currently being discussed in some circles. Using data on operational metrics as well as patient and caregiver attributes made available through our partnership with a large private hospice company, I propose to build a dynamic structural model to better understand the hospice manager’s quality choices and the impact of possible regulatory changes.

Showrooming - an increasingly popular form of research shopping whereby a customer gathers information from a brick-and-mortar store but purchases online (possibly from a competitor) - is widely considered to have hurt conventional brick-and-mortar retailers. In the third chapter we consider strategies that a retail firm may use to potentially take advantage of customers’ showrooming behavior. In particular, I propose to

study the option of ordering online from within the store with some additional convenience to the customer, e.g. waiving the shipping cost or not having to transport the product, considering this option's impact on the firm's operational decisions including inventory level and price. We seek to identify when a firm should offer such an option, and how its choice depends on the online competitor's price, the firm's channel margins and customers' inconvenience costs.