

Operations Management Summer Camp 2016

Date: Friday, 12 August 2016

Venue: Singapore Management University
Lee Kong Chian School of Business
Level 3, Seminar Room (SR) 3.1

Programme

9.40am - 10.10am	Registration (outside SR 3.1) Morning Refreshment @ Catering area 3A, near SR 3.10, Level 3
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10.10am - 10.15am	Welcome Remarks
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10.15am - 11.15am	Paper 1 Presenter: Rowan WANG Yu, SMU Discussant: Rachel ZHANG, Hong Kong University of Science and Technology Title: Appointment Systems under Service Level Constraints
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Abstract:

We consider a new model of appointment scheduling where customers are given the earliest possible appointment times under the service level constraint that the expected waiting time of each individual customer cannot exceed a given threshold. We apply the theory of majorization to analytically characterize the structure of the optimal appointment schedule. We show that, the optimal inter-appointment times increase with the order of arrivals. That is, the optimal inter-arrival time between two customers later in the arrival process is longer than that between two customers earlier in the arrival process. We study the limiting behavior of our system, and prove that, when customer service times follow an exponential distribution, our system converges asymptotically to the D/M/1 queueing system as the number of arrivals approaches infinity. We also extend our analysis to systems with multiple servers.

11.15am - 12.15pm

Paper 2

Presenter: Shantanu BHATTACHARYA, SMU

Discussant: Serguei NETESSINE, INSEAD

Title: Optimal Sequential Development Investments with Exogenous Technologies and Learning

Abstract:

We address the challenge of determining the optimal development investments in products or services for a firm with limited development resources, when the development opportunities arise over time, and they are based on two distinct exogenous technologies. In the lean startup framework, sequential investments in new technologies are favored over large upfront investments in products or services based on new products and services. Upfront investment in a product or a service from a platform technology that is currently available gives higher returns from opportunities based on the platform technology in the future, due to the associated learning effects. There is also the potential for a radical new technological opportunity in the future. The investment in the platform technology does not have any benefits for products or services based on the new technology. Contingent on the sequence that technologies arise, we formulate the dynamic resource allocation problem, and characterize the optimal development investments that determine the firm's investment roadmap. We show that the firm's optimal investment in platform development has a nuanced relationship with the sequence of arrival of the platform and new technologies. Interestingly, if the learning effect is low (below a certain threshold) then the firm's optimal investment in platform development increases if the new technology arrives early. In addition, the investment in platform development decreases if there is uncertainty about the future resources availability. Insights are then provided into the properties of the optimal investments based on the model parameters.

12.15pm - 1.30pm

Lunch @ Catering area 3A, near SR 3.10, Level 3

1.30pm - 2.30pm

Paper 3

Presenter: Daniel ZHENG Zhichao, SMU

Discussant: Carri CHAN, Columbia University

Title: Effects of Rescheduling on Patient No-show Behavior in Outpatient Clinics

Abstract:

We study patients' no-show behavior in an outpatient appointment system for both new and follow-up patients, and explicitly consider rescheduling. Previous studies have either focused on appointments for new patients or treated rescheduled appointments as new ones. Findings from most of these studies

	<p>reveal that no-show probability increases significantly with waiting time. We offer a more nuanced understanding of this costly phenomenon. Using clinical data, we demonstrate that waiting time has little effect on no-show behavior for follow-up patients. Besides, no-show behavior is significantly affected by the rescheduling process, and patients of different types respond to rescheduling in notably different ways. For follow-up patients, no-show probability decreases when the appointment was rescheduled at the patient's request and increases when it was rescheduled by the clinic. New patients, in contrast, only care about whether the rescheduled appointment is sooner or later than the original appointment, rather than who initiated rescheduling. To the extent that rescheduling has a significant impact on no-show behavior, our findings offer managers an effective way to improve attendance rates.</p>
<p>2.30pm - 3.30pm</p>	<p>Paper 4</p> <p>Presenter: Xin FANG, SMU</p> <p>Discussant: Vishal GAUR, Cornell University</p> <p>Title: Incentive Issues in the Implementation of Urban Consolidation Centers</p> <p><u>Abstract:</u></p> <p>The growth of urban migration and e-commerce worsens the traffic congestion in cities, creating negative impacts on the well-being of cities both economically and environmentally. An urban consolidation center ('UCC') is a potential solution to this problem, which consolidates the goods from multiple carriers before shipping them to city centers so that it reduces the traffic jam and pollution in cities. Despite of their benefits, many UCC projects are not successful due to the reluctance of carriers to cooperate. In this paper, we develop a game-theoretical model that captures the incentives of carriers to use a UCC for their deliveries to city centers. Our analysis reveals that the price that carriers are willing to pay for the service of the UCC can be too low for the UCC to make a profit. Further, improving carriers' awareness about the adverse environmental impacts of their deliveries may not be effective in motivating them to cooperate. To address these incentive issues, we propose that a UCC can work as an information intermediary among carriers for capacity sharing. We find that, in this case, the UCC can always make a profit from commissions, and carriers also have stronger incentives to cooperate.</p>
<p>3.30pm - 4.00pm</p>	<p>Tea Break @ Catering area 3A, near SR 3.10, Level 3</p>

<p>4.00pm - 5.00pm</p>	<p>Paper 5</p> <p>Presenter: Yun Fong LIM, SMU</p> <p>Discussant: Jan VAN MIEGHEM from Northwestern University</p> <p>Title: How To Efficiently Serve A Finite Number of Jobs in A Tandem System with Flexible Servers?</p> <p><u>Abstract:</u></p> <p>We consider a tandem system with two stations and two servers. There is a finite number of jobs waiting to be served in front of station 1. The servers are cross-trained to work at both stations. We assume the time duration for each server to serve a job at each station is exponentially distributed with a rate that depends on the server, the station, and the job. Our goal is to maximize the average throughput of the system. We study the performance of three server assignment policies that are implementable in practice. We find that the dynamic server assignment policy proposed by Andradottir, Ayhan, and Down (2001) remains efficient for a finite supply of jobs, and attains the optimal average throughput if the service rates are independent of the jobs. However, if the service rates depend on the jobs (for example, due to fatigue or learning over the jobs), the policy may not be optimal. We also extend our model to incorporate transfer costs of the servers' movements between the stations as well as the effects of service errors.</p>
<p>5.00pm - 5.15pm</p>	<p>Concluding Remarks</p>
<p>6.00pm</p>	<p>Group Dinner (OM faculty and Discussants)</p>

Discussants' Profile:

Carri W. Chan is the Sidney Taurel Associate Professor of Business in the Decision, Risk and Operations Division at Columbia Business School. Her research interests are in data-driven modeling and analysis of service systems with an emphasis on healthcare operations management. Her current focus is on combining empirical approaches with mathematical modeling to develop evidence-based approaches to improving patient flow through hospitals. She is the recipient of a 2014 NSF CAREER award, an NSF/AHRQ grant, as well as a number of best paper awards. She received her BS from MIT in 2004 and MS and PhD from Stanford University in 2006 and 2010, all in Electrical Engineering.

Vishal Gaur is the Emerson Professor of Manufacturing Management in Samuel Curtis Johnson Graduate School of Management at Cornell University and is currently serving as the Associate Dean for MBA programs. His research interests lie in statistical and analytical models for retail operations and supply chain management. His work uses different types of data sets, including internal transaction-level data from firms, online consumer browsing data, and aggregate publicly available firm-level or industry-level data to assess performance, improve demand forecasting, and optimize decision-making. Gaur teaches the MBA core course in operations management and an MBA elective course in retail operations. He has received numerous awards for his research and teaching: the Johnson Faculty Research Award in 2012-13, the Clifford H. Whitcomb Faculty Fellowship in 2010-11, the Johnson Core Faculty Award three times, by the graduating classes of 2015, 2012 and 2008, the 2008 Manufacturing and Service Operations Management Best Paper Award, the Wickham Skinner Early Career Research Accomplishments Award by Production and Operations Management Society (POMS) in 2006, and honorable mention in the George B. Dantzig Dissertation Award Competition in 2001. He serves as a department editor for Management Science journal and an associate editor for Manufacturing and Service Operations Management, Operations Research, and Production and Operations Management. Gaur received his Ph.D. from the Wharton School, University of Pennsylvania.

Serguei Netessine is The Timken Chaired Professor of Global Technology and Innovation at INSEAD and the Research Director of the INSEAD-Wharton alliance. Prior to joining INSEAD in 2010, he has been a faculty member at the Wharton School, University of Pennsylvania.

Prof. Netessine received BS/MS degrees in Computer Science and Electrical Engineering from Moscow Institute of Electronic Technology and, after working for Motorola and Lucent Technologies, he also received MS/Ph.D. degrees in Operations Management from the University of Rochester. His current research focuses on business model innovation and operational excellence and he worked on these topics with numerous organizations including Federal Aviation Administration (USA), Lockheed Martin, Procter & Gamble, McDonald's, Rolls Royce, Comcast, Expedia, ABB and US Air Force. He serves on advisory boards of multiple startup companies and regularly speaks on Innovation and Entrepreneurship.

Professor Netessine has been the recipient of several teaching awards for delivering classes to MBA and Executive MBA students at the Wharton School and INSEAD, and he frequently teaches in Executive Education Programs. Prolific academic writer, professor Netessine holds senior editorial positions at

several leading academic journals and he co-authored dozens of publications in prominent management journals, including *Management Science*, *Operations Research*, *Harvard Business Review* and other. His work has received extensive media coverage in *CIO Magazine*, *the Economist*, *Forbes*, *Multichannel Merchant*, *New York Times*, *US News* and *Strategy & Business* and other press.

His latest book [The Risk-Driven Business Model: Four Questions that will Define Your Company](#) has been published with Harvard Business Press in 2014.

Jan Van Mieghem is the Harold L. Stuart Distinguished Professor of Managerial Economics and Professor of Operations Management at the Kellogg School of Management at Northwestern University.

He is a member of the Royal Flemish Academy of Sciences and Arts of Belgium and a Distinguished Fellow of the Manufacturing and Service Operations Management Society. His research focuses on product, service and supply chain operations, and links strategy and execution. He is the author of over 40 academic articles published in the leading international journals, and of two books. He serves on the editorial board of several professional journals and was editor of the operations and supply chain area of *Operations Research*. He teaches courses in operations management and strategy in MBA, Ph.D. and executive programs and advises firms on those topics.

Jan Van Mieghem received his Ph.D. in Business and M.S. in Electrical Engineering from Stanford University, and ir. in Electrical Engineering from the Katholieke Universiteit Leuven, Belgium. From 2009-2010, he served as one of two Senior Associate Deans at the Kellogg School. From 2006 – 2009, he was chairman of the Department of Managerial Economics and Decision Sciences. Currently, Jan serves as the Academic Director of the Kellogg Executive MBA program and of three non-degree executive programs. The Executive Operations Experience is an innovative educational partnership between academia and consultancy McKinsey & Co. that combines learning in the classroom and in model factories.

Rachel Q. Zhang is Professor of Industrial Engineering and Logistics Management at Hong Kong University of Science and Technology. She received her PhD in Industrial Engineering and Management Sciences in 1994 from Northwestern University and was previously a faculty member in the Department of Industrial and Operations Engineering at University of Michigan, and the Johnson Graduate School of Management at Cornell University. Her research has appeared in such journals as *Operations Research*, *Management Science*, *Interfaces*, *IIE Transactions*, *Naval Research Logistics*, and *Advances in Applied Probability*. She received an honorable mention in the INFORMS Nicholson Paper Competition in 1994 and an early-career award (CAREER) from the US National Science Foundation in 1995.