Operations Management Summer Camp 2019

Date: Friday, 16 August 2019

Venue: Singapore Management University
Lee Kong Chian School of Business
Level 2, Seminar Room (SR) 2.1

Programme	
9.15am – 9.45am	**Registration** (outside SR 2.1) **Morning Refreshment** @ Catering area 2A/2B, near SR 2.8, Level 2
9.45am - 10.00am	**Opening Speech by Professor Gerry George, Dean of Lee Kong Chian School of Business, Singapore Management University**
10.00am - 11.00am	**Paper 1** Presenter: **Bhavani Shanker UPPARI, Singapore Management University** Discussant: **Sarang DEO, Indian School of Business** Title: **Inconvenience, Liquidity Constraints, and the Adoption of Off-Grid Lighting Solutions** Abstract: A significant proportion of world's population does not have access to grid-based electricity, and so relies on off-grid lighting solutions. Rechargeable bulb technology is becoming prominent as an alternative off-grid lighting model in developing countries. In this paper, we explore the consumer behavior and the operational inefficiencies that result under this model. Specifically, we are interested in measuring the impact of inconvenience (of travel to recharge the bulb) – which is a peculiar feature of this model – along with the impact of liquidity constraints on bulb usage. We also discuss the

	efficacy of strategies that address these factors. We employ multiple methodologies: we first build a model of recharge decisions and theoretically explore its properties. To test (both ordinal and cardinal) predictions of this model, and to examine the performance of counterfactual strategies, we conduct field experiments in Rwanda in collaboration with a company that operates rechargeable bulbs business. Using our model as the data generating process, we then estimate its parameters by fitting it to the experimental data. We show that the fitted model predicts the data reasonably well. Using the estimated model, we find that inconvenience-based strategies – which are usually ignored by the firms and the policymakers – tend to perform as well as, and sometimes better than price-based strategies in terms of improving the bulb usage. We also discuss the implications of our results for the off-grid firms and the policymakers.
11.00am - 12.00pm	**Paper 2** Presenter: **Daniel Zhichao ZHENG, Singapore Management University** Discussant: **Turgay AYER, Georgia Institute of Technology** Title: **Optimal Stopping for Medical Treatment with Predictive Information** Abstract: Data availability and advancement in machine learning techniques make accurate prediction of the future a foreseeable reality. How to efficiently utilize the predictive information in a multistage medical decision-making environment, however, remains understudied. In this paper, we develop a discrete-time, finite-horizon Markov decision process model, incorporating perfect predictive information, to support decisions on medical treatment continuation. We extend our framework to a situation with prediction errors, using a partially observable Markov decision process. We characterize the structure of the optimal policies under both settings and show that knowing predictive information can lead to significantly different decision protocols. We calibrate and test our models with an extubation problem in an intensive care unit (ICU). Using a patient-level data set, we compare the performance of different extubation policies and demonstrate that incorporating predictive information can decrease extubation failure rate and reduce ICU length-of-stay of ventilated patients, especially for patients with poor initial conditions.
12.00pm - 1.15pm	**Lunch** @ Catering area 2A/2B, near SR 2.8, Level 2

1.15pm - 2.15pm	**Paper 3**
	Presenter: **Helen Yangfang ZHOU, Singapore Management University**
	Discussant: **Scott WEBSTER, Arizona State University**
	Title: **Integrated Optimization of Fertilization Application, Cultivation and Harvesting**
	Abstract: Motivated by the fresh produce industry, this paper studies the decisions faced by a farmer growing one single crop: fertilizer application, cultivation and harvesting. We develop a two-stage stochastic program capturing uncertainties in both yield and harvesting labor cost as well as the effect where yield in the second stage is stochastically increasing in the fertilizer application quantity in the first stage. We characterize the farmer's optimal decisions as well as the impact of these two uncertainties on the farmer's optimal decisions and profitability. Based on models calibrated to data: 1) we find that there is a significant value using our integrated optimization model over commonly used heuristics in practice; 2) we quantify how the uncertainties in the farm yield and harvesting labor cost affect two sustainable measures---the yield gap (the gap between the theoretical maximum yield and the actual yield) and food loss (unharvested crops). Our findings not only aid farmers in making farm planning decisions but also provide insights into how policymakers could tackle the food security challenges by encouraging farmers to close the gap and reduce waste.
2.15pm - 3.15pm	**Paper 4**
	Presenter: **Xin FANG, Singapore Management University**
	Discussant: **Mabel CHOU, National University of Singapore**
	Title: **Product Description and Consumer Reviews in Omni-channel Retailing**
	Abstract: This paper studies how a retailer strategically provides product information in its offline and online channels. The two channels are operated either separately (dual-channel) or collectively (omni-channel). We consider two types of information: product description, which helps consumers identify whether the product fits their tastes, and consumer reviews, which are generated by the consumers who have made the purchase. We find that, without consumer reviews, the omni-channel strategy leads to a higher profit

	than the dual-channel strategy if and only if the limit of product description in the offline channel is low and consumers' valuation of the product is small. However, with consumer review, even if the limit of product description in the offline channel is high, the omni-channel strategy can still lead to a higher profit. Furthermore, consumer reviews can reduce the retailer's profit if consumers' valuation is sufficiently large.
3.15pm - 3.45pm	**Tea Break** @ Catering area 2A/2B, near SR 2.8, Level 2
3.45pm - 4.45pm	**Paper 5** Presenter: **Rowan Yu WANG, Singapore Management University** Discussant: **Chung Piaw TEO, National University of Singapore** Title: **Optimal Service System Design with Flexible Servers and Priority Customers** <u>Abstract:</u> We study a non-preemptive service system with two priority classes and two flexible servers. We characterize the optimal server allocation policy for minimizing the long-run average system waiting cost of such system. We show that the optimal policy exhibits a threshold type, and we develop an algorithm to compute the threshold. In comparison to a benchmark policy where a dedicated server is assigned to customers with a higher priority, we find that the optimal policy in our proposed flexible configuration always performs better in terms of the long-run average system waiting cost as well as the probability that a new arrival has to wait, for both classes of customers.
4.45pm - 5.45pm	**Paper 6** Presenter: **Yini GAO, Singapore Management University** Discussant: **Alfonso J. Pedraza-Martinez, Indiana University** Title: **Post-Disaster Humanitarian Logistics Planning: A Time-to-Survive Framework** <u>Abstract:</u> Designing and planning humanitarian supply chains for post-disaster response entails great challenges due to disrupted supply chain under uncertain decision environment coupled with great urgency. One of the most critical

	issues is the delay in the transportation of emergency relief items due to disrupted infrastructure capacity. Moreover, at the early stage after disasters, the transportation conditions and demand for relief items are uncertain to decision makers before the actual shipping due to lack of information. In this paper, we consider the post-disaster relief resource logistic planning problem with uncertainties in the transportation capacities and demands. We propose to use Time-to-Survive (TTS) as a new performance measure for the humanitarian relief effort and adopt a two-stage distributionally robust approach to determine the optimal transportation plan. We show that this two-stage distributionally robust problem is equivalent to a conic problem that can be solved via a positive semi-definite programming problem. We apply this analytical framework to a post-disaster humanitarian logistics planning problem, extracted from a case study on Typhoon Haiyan.
5.45pm - 6.00pm	**Concluding Remarks**
6.00pm	**End of OM Summer Camp 2019**

Discussants' Profile:

Turgay AYER is the George Family Foundation Early Career Professor in H. Milton Stewart School of Industrial and Systems Engineering and is the Director of Business Intelligence and Healthcare Analytics at the Center for Health and Humanitarian Systems at Georgia Institute of Technology. In addition, Dr. Ayer has a courtesy appointment at Emory Medical School.

His research focuses on socially responsible operations and practice-focused research, with a particular emphasis on healthcare analytics. His research papers have been published in top tier management, engineering and medical journals, and covered by popular media outlets, including the Wall Street Journal, Washington Post, US News, and NPR.

Dr. Ayer has received over $2 million grant funding and several awards for his work, including an NSF CAREER Award (2015), first place in the MSOM Best Practice-Based Research Competition (2017), INFORMS Franz Edelman Laureate Award (2017), and Society for Medical Decision Making Lee Lusted Award (2009).

Ayer serves an associate editor for Management Science , Operations Research , and MSOM (Special Issue), and is a past president of the INFORMS Health Application Society. He received a B.S. in industrial engineering from Sabanci University in Istanbul, Turkey, and his M.S. and Ph.D. degrees in industrial and Systems Engineering from the University of Wisconsin - Madison.

Mabel C. CHOU is an Associate Professor in the Department of Analytics and Operations at National University of Singapore (NUS) and affiliate professor at the NUS Business Analytics Center. She received her B.Sc. degree in mathematics from National Taiwan University, M.Sc. degree in mathematics and Ph.D. degree in industrial engineering and management sciences from Northwestern University. Her research focuses on production scheduling and design/analysis of supply chain and transportation networks. She is currently serving as an area editor for Computers & Operations Research, a senior editor for Production and Operations Management, and an associate editor for Flexible Services and Manufacturing Journal.

Sarang DEO is Associate Professor of Operations Management and the Executive Director of the Max Institute of Healthcare Management at the Indian School of Business. His primary research interest is health care operations, especially investigating the impact of operations decisions on population level health outcomes. His research areas spans the influenza vaccine supply chain and the phenomenon of ambulance diversion (in the US), the adult HIV treatment supply chains and the infant HIV diagnosis networks (in sub-Saharan Africa), and engaging private practitioners to improve diagnosis and treatment of Tuberculosis (in India). He is a consultant to the Clinton Health Access Initiative and the Bill and Melinda Gates Foundation and his research has been funded by the US National Science Foundation, Grand Challenges Canada and Grand Challenges Exploration. He serves as Associate

Editor of several journals including *Management Science, MSOM, Operations Research Letters, Service Science, Socioeconomic Planning Sciences and Stochastic Systems.*

Prior to joining ISB, Sarang was Assistant Professor at the Kellogg School of Management. He was a management consultant in the Accenture's Mumbai office before embarking on an academic career. Sarang has a PhD from UCLA Anderson School of Management, MBA from IIM Ahmedabad, and BTech from IIT Bombay.

Alfonso J. PEDRAZA-MARTINEZ is an Associate Professor of Operations and Decision Technologies and Grainger Faculty Fellow at the Indiana University Kelley School of Business. He investigates humanitarian operations management. His award winning research has informed the practice of logistics at the Red Cross Movement, World Food Programme and World Vision International.

Alfonso has published in academic journals such as Journal of Operations Management (JOM), Production and Operations Management (POM), and Disasters. He serves as Senior Editor at POM and is a member of the Editorial Review Board at JOM.

At the Kelley School Alfonso teaches logistics and supply chain management at the undergraduate, MBA and PhD levels. He holds a PhD in Management from INSEAD. Before doing his PhD, he was a junior faculty at Universidad de los Andes School of Management in Colombia, where he taught optimization, simulation and data mining. He also has 5 years of working experience on humanitarian logistics and sustainable operations with the governments of Bogota and Colombia, respectively.

Chung Piaw TEO is Provost Chair Professor and Director of the Institute of Operations Research and Analytics in NUS. Prior to his current appointments, he was Acting Deputy Dean, Vice-Dean of the Research & PhD Program as well as Head of Decision Sciences Department at NUS Business School. He was an Eschbach Scholar in Northwestern University (US), Professor in Sungkyunkwan Graduate School of Business (Korea), and a Distinguished Visiting Professor in YuanZe University (Taiwan).

His research interests lie in service and manufacturing flexibility, discrete optimization, ports container operations, matching and exchange, and healthcare. He is currently a department editor in MS (Optimization), and was an area editor for OR (Operations and Supply Chains). He has also served on several international committee such as the Chair of the Nicholson Paper Competition (INFORMS, US), member of the IMPACT Prize Committee (INFORMS, US), Fudan Prize Committee on Outstanding Contribution to Management (China), and the Hong Kong PhD Fellowship Scheme Selection Panel.

Scott WEBSTER is the Bob Herberger Arizona Heritage Chair in supply chain management at the W. P. Carey School of Business at Arizona State University. His research focuses primarily on problems related to pricing and inventory, and on challenges that arise in agriculture and nonprofit settings. He has worked in industry in the areas of consulting and finance. He teaches graduate classes in supply chain management.