A Blockchain-Based Framework for Implementing Extended Producer Responsibility

Behzad Esmailian, Lecturer, Western New England University, United States
Jianzhou Qi, Student, University at Buffalo, SUNY, United States
Sara Behdad, Assistant Professor, University at Buffalo, SUNY, United States

The limited engagement of obliged companies, non-cooperation between important stakeholders, and no transparency have been among impediments of implementing Extended Producer Responsibility (EPR). The study discusses a Blockchain-based framework for traceability of products and authentication that products belong to particular OEMs towards practical implementation of EPR and product take-back.

Waste-Pickers' Role on Brazilian Solid Waste Closed Loop Systems

Mónica Luna, Associate Professor, Federal University of Santa Catarina, Brazil
Diego Vazquez-Brust, Professor, Federal University of Santa Catarina, United Kingdom
Lucila Campos, Associate Professor, Federal University of Santa Catarina, Brazil

Brazilian Solid Waste Policy (BSWP) requires insertion of waste-pickers in waste collection systems. We use qualitative research in 4 types of waste to study factors influencing waste-pickers' role in closed loop waste systems (e.g. collection options, market price for recyclable waste). Causal loop diagrams are used to visualize that influence.

Improving Remanufacturing Core Recovery and Profitability Through Seeding

James Abbey, Assistant Professor, Texas A&M University College Station, United States
Neil Geismar, Associate Professor, Texas A&M University College Station, United States
Gilvan Souza, Professor, Indiana University Bloomington, United States

Durable goods firms sell new products as remanufactured at the start of a new product lifecycle to start efficient remanufacturing earlier and to fulfill demand for remanufactured products earlier. The cost of producing a new unit and the product lifecycle curve determine profitability of seeding.

Strategic Design of Multiple Lifecycle Products for Remanufacturing Operations

M. Serkan Akturk, Assistant Professor, Clemson University, United States
James Abbey, Assistant Professor, Texas A&M University College Station, United States
Neil Geismar, Associate Professor, Texas A&M University College Station, United States

A product's level of remanufacturability depends on design paradigm, e.g., design for remanufacturing versus design for assembly. We analytically investigate how the optimal design choice depends on the interactions of market conditions (competition, clockspeed, product value) with characteristics of design paradigms (time-to-market, manufacturing and remanufacturing costs).

Interaction of Contract Types and Store-Brand Introduction

Yugang Yu, Professor, University of Science and Technology of China, China
Fujiqiang Zhang, Professor, Washington University St Louis, United States
Shengming Zheng, Student, University of Science and Technology of China, China

This paper studies the downstream RM's optimal store-brand introduction decision in two different contracts, wholesale-price contract and agency-selling contract. In wholesale-price contract, the downstream firm can set the retail price for the national-brand and store-brand if the firm chooses to introduce store-brand.

The Strategic Analysis of Logistics Service Sharing in an E-Commerce Platform

Xuelian Qin, Student, Huazhong University of Science & Technology, China
Zhiyue Liu, Professor, Huazhong University of Science & Technology, China
Lin Tian, Associate Professor, Fudan University, China

Recently, the e-commerce market has emerged with a new trend of business-to-business logistics service sharing – the hybrid platform shares a self-supporting logistics service system with its marketplace sellers. In this paper, we develop an analytical model to examine the strategic and economic implications of logistics service sharing between the platform and the seller.

Managing Demand with an Upgrade Program in the Presence of a Product Rollover

Liming Wang, Student, Tsinghua University, China
Yongbo Xiao, Associate Professor, Tsinghua University, China
Jihong Zhang, Professor, Beijing Foreign Studies University, China

Upgrade program is the trade-in practice which provides customers with the option to upgrade to new product with a pre-determined discount. We examine the effectiveness of this program with the consideration of uncertain salvage price and investigate how production cost and the market size of loyalty customers affect its profitability.
In this session, we explore various optimization problems in the context of child adoption and foster care visitations. Optimization in the context of child adoption and foster care visitations is critical for maximizing the weekly schedule for both children and parents, and for determining the feasibility of multiple visits. This is because the selection of customers to be targeted has a strong impact on the effectiveness of the direct marketing activities. We propose a mathematical model for optimally assigning customers to activities.

Integrated Vehicle Routing and Scheduling to Optimize Foster Care Visitations

Integrating Vehicle Routing and Scheduling to Optimize Foster Care Visitations

We solve a real foster care visitation scheduling problem using combinatorial concepts from the team orienteering problem. By generating the tours based on drivers and case workers availability, while also respecting child and parent availability at multiple locations, we determine a feasible schedule that maximizes the number of weekly visits.

Economic Assessment of Policies to Prevent Childhood Lead Poisoning

We estimate the annual economic burden of childhood lead exposure in the U.S. to be $84 billion and identify the potential for residential lead prevention and remediation policies to cut lead exposure levels for young children, resulting in significant long-term economic benefits and in many cases positive net societal returns.

Dynamic Pricing and Volume Allocations in the Dairy Industry

Streamlining production and operations in the dairy industry face many challenges due to the complexity of the multitude of processes involved. We design a novel, demand-driven approach for one of the world's foremost dairy producers by integrating biweekly production planning and real-time revenue management systems to maximize expected margins.

Optimal Customer Selection for Direct Marketing Campaigns

In direct marketing, companies promote products or services by contacting customers personally via direct mail, emails, or phone calls. The selection of customers to be targeted has a strong impact on the effectiveness of the direct marketing activities. We propose a mathematical model for optimally assigning customers to activities.

Investing in Performance: Information and Merit-Based Incentives in K-12 Education

We examine the relationship between information on student performance and monetary incentives for teachers using a two-period principal-agent model. We establish that for low-performing schools, the return from merit-based incentives is always greater than that from information via interim assessments. For high-performing schools, we identify settings where information is demotivating.

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Saturday, 08:00 AM - 09:30 AM

Achal Bassamboo, Associate Professor, Northwestern University, United States
Naveed Chehrazi, Assistant Professor, University of Texas Austin, United States
Yannis Stamatopoulos, Assistant Professor, University of Texas Austin, United States
Welfare Implications of Inventory-Driven Dynamic Pricing
093-0403

We study the problem of choosing a family to recommend as a possible adoptive match for a child and focus on the trade-off between learning and earning when selecting a family given the family’s history of rejections. We also provide lessons learned from pilot implementations of the Family-Match platform.

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Saturday, 08:00 AM - 09:30 AM, Kalorama
Invited Session: Smart City Operations: Ride Sharing and Autonomous Vehicles
Chair(s): Soo-Haeng Cho

Motivated by a leading taxi operator in Singapore, we consider the idle vehicle allocation problem with uncertain demands and other uncertain covariate information such as weather. We employ a novel distributionally robust optimization approach that utilizes historical covariate information via multivariate regression tree and validate its performance using real data.

093-0855 Robust Vehicle Allocation with Uncertain Covariates
Zhaowei Hao, Post Doc/Researcher, National University of Singapore, Singapore
Long He, Assistant Professor, National University of Singapore, Singapore
Zhenyu Hu, Assistant Professor, National University of Singapore, Singapore
Jun Jiang, Student, National University of Singapore, Singapore

We investigate the effects of autonomous vehicles (AVs) on highway congestion. We develop a multi-lane queuing model and calibrate the model to data. We compare the performance of two policies both analytically and numerically: designating a lane to AVs, and allowing AVs to drive on any lane together with regular vehicles.

093-0935 A Queueing Model and Analysis for Autonomous Vehicles on Highways
Neda Mirzaeian, Student, Carnegie Mellon University, United States
Soo-Haeng Cho, Associate Professor, Carnegie Mellon University, United States
Alan Scheller-Wolf, Professor, Carnegie Mellon University, United States

We compare the matching efficiency of on-demand ride-hailing systems to the traditional street-hailing systems. We approximate the on-demand ride-hailing and street-hailing using an M/M/K state dependent service rate and further propose adding response caps to improve the matching efficiency.

093-2119 The Impact of the Gig-Economy on Financial Hardship Among Low Income Households
Kaitlin Daniels, Assistant Professor, Washington University St Louis, United States
Michal Grinstein-Weiss, Professor, Washington University St Louis, United States

The expansion of the gig-economy (i.e. marketplaces for on-demand service, like Uber) provides value to workers by offering flexibility, but circumvent traditional employee protections (e.g. the minimum hourly wage). We empirically measure the effect of gigs on workers’ ability to meet their short-term financial obligations.

093-2186 We Are on the Way: Analysis of On Demand Booking Systems
Guoyun Feng, Student, University of Minnesota, United States
Guangwen Kong, Assistant Professor, University of Minnesota - Twin City, United States
Zizhuo Wang, Assistant Professor, University of Minnesota, United States

We compare the matching efficiency of on-demand ride-hailing systems to the traditional street-hailing systems. We approximate the on-demand ride-hailing and street-hailing using an M/M/K state dependent service rate and further propose adding response caps to improve the matching efficiency.

093-2458 Pricing Shared Bikes: Profit vs. Social welfare Management
Shuping Ding, Student, Tsinghua University, China
Yongbo Xiao, Associate Professor, Tsinghua University, China

This paper studies the impact of service level and bike quality on a shared bike firm’s performance. We build a model to study the optimal pricing strategy for a monopolist firm to maximize profit or social welfare and find when the firm is better off by implementing the optimal strategy.

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Saturday, 08:00 AM - 09:30 AM, Jay
Invited Session: Promotional Activities in Retailing
Chair(s): Olga Perdikaki

We are on the way: Analysis of On Demand Booking Systems
Guoyun Feng, Student, University of Minnesota, United States
Guangwen Kong, Assistant Professor, University of Minnesota - Twin City, United States
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We investigate the effects of autonomous vehicles (AVs) on highway congestion. We develop a multi-lane queuing model and calibrate the model to data. We compare the performance of two policies both analytically and numerically: designating a lane to AVs, and allowing AVs to drive on any lane together with regular vehicles.

093-0039 Management and Effects of In-Store Promotional Displays
Oguz Cetin, Student, University of North Carolina Chapel Hill, United States
Adam Mersereau, Associate Professor, University of North Carolina Chapel Hill, United States
Ali Parfakturk, Associate Professor, Kenan-Flagler Business School, United States

This work examines a brick-and-mortar retailer’s choice of product to include in a promotional display. Retailers need to understand the promotional display problem because it is a powerful demand-shaping lever. In our paper, we develop analytical insights using nested multinomial logit model of customer choice.

093-0403 Welfare Implications of Inventory-Driven Dynamic Pricing
Yannis Stamatopoulos, Assistant Professor, University of Texas Austin, United States
Naveed Chehrazi, Assistant Professor, University of Texas Austin, United States
Achal Bassamboo, Associate Professor, Northwestern University, United States

This paper illustrates that when pricing decisions are made in conjunction with other operational decisions, dynamic pricing can result in increased system efficiency which can pass through to consumers. We demonstrate this point in a brick-and-mortar retail setting by extending the EOQ model to accommodate dynamic pricing.
Promotional displays are a powerful tool to boost consumer engagement. As a result, we propose a methodology to identify a profit-maximizing selection of products for promotional display using grocery store sales transaction data. Our methodology results in substantial improvement in profit when compared to an industry benchmark.

Trends in fashion can help determine effective personalized promotion plans. We introduce a personalized demand model that captures customer-trends from transaction data, which allows us to draw causal inference on the effects that targeted promotions have. The promotion targeting is hard problem, so we propose an efficient greedy algorithm.

To explore the photovoltaic (PV) charging station environmental and operational contributions to the main power grid, we propose a distributed robust scheduling model where charging service is assumed to follow an M/G/v shared processor charging system. A case study in Amsterdam is conducted for verifying efficient PV operations.

Motivated by a recent Canadian regulation to factor in upstream emissions during environmental impact assessment of energy projects, we adopt a cooperative game model and derive the nucleolus as a consistent mechanism to apportion upstream emission responsibility in energy supply chains. We develop algorithmic results and provide an implementation framework.

In this study, U.S. manufacturing industries' domestic and global supply chain-linked economic and energy use are investigated. Multi-Region Input Output (MRIO) models were built. A 20-year study period was determined based on data availability. Results are compared in terms of the change manufacturing industries' dependence on renewable and nonrenewable energy.

We study multi-stage serial supply chains subject to disruptions. We show that it is often optimal to hold more risk mitigation inventory downstream than upstream (despite the higher costs). Likewise, it is often optimal to hold more reserve capacity downstream than upstream.
In rewards-based crowdfunding, a firm (campaigner) pre-sells a new product and solicits financial contributions from the crowd (consumers) to cover production costs. This paper investigates how the presence of both social learning and network externalities affect the strategic interaction between a crowdfunding firm and forward-looking consumers.

093-2139 Alliance Formation Among Competitors
Christopher Tang, Professor, University of California Los Angeles, United States
Yue Dai, Professor, Fudan University, China
Xiaole Wu, Assistant Professor, Fudan University, China

This paper investigates the implications of distributed renewable energy (e.g., residential solar) for utility profits and social welfare under the net metering policy. We show that the presence of net-metered distributed renewable energy can result in a strictly larger expected profit for utilities when wholesale market dynamics are factored in.

093-2416 Ethics in Purchasing
Xenophon Koufteros, Professor, Texas A&M University College Station, United States

In this tutorial, Xenophon Koufteros presents various challenges and best practices of research on ethics in purchasing. Findings from studies in the US, China, Italy, Spain, Finland and other countries in Europe, Asia, Africa, and Latin America will discuss innovative methodological approaches.

093-1498 Mind the Gap: Coordinating Energy Efficiency and Demand Response
Eric Webb, Assistant Professor, University of Cincinnati, United States
Owen Wu, Associate Professor, Indiana University, United States
Kyle Cattani, Associate Professor, Indiana University Bloomington, United States

Energy efficiency programs and demand response programs, two popular approaches to energy demand-side management, traditionally are designed and evaluated independently. Breaking with this tradition, we examine the interactions between long-term energy efficiency upgrades and daily demand response participation at an industrial firm.

093-1758 Net-Metered Distributed Renewable Energy: A Peril for Utilities?
Nur Sunar, Assistant Professor, Kenan-Flagler Business School, United States 
Jayashankar Swaminathan, Professor, University of North Carolina Chapel Hill, United States

In this study, we find global supply chain relationships help firms access cross-border financing in the international capital markets. This result is supported empirically by all major financing vehicles, including stock cross-listing, bond issuance, bank loans, and M&A deals, and is robust in controlling strategic disclosure concerns.

Contracts help shift price risk between supply chain partners. However, by nature of being further downstream, firms often cannot verify prices that suppliers report. We first theorize about a firm’s equilibrium, contract choice, and then test predictions empirically using a proprietary data set provided by BMW.

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We study potential alliance formation among three firms with asymmetric capacity. The big firm is not capacity constrained, but the two small firms have limited capacity. Each firm has loyal buyers and tries to capture the demand from switchers. Because of antitrust, we derive equilibrium alliances of two firms.

093-0801  Inventory Transshipment Game with Limited Supply: Trap or Treat  
Ziteng Wang, Assistant Professor, Northern Illinois University, United States  
Yue Dai, Professor, Fudan University, China  
Shu-Cheng Fang, Professor, North Carolina State University, United States  

We investigate a two-newsvendor inventory transshipment game with limited supply. Nash equilibrium of orders exists only under certain conditions. Compared with a no-transshipment scenario, a newsvendor may be worse off. Numerical studies indicate that transshipment price plays an important role in this phenomenon. A coordinating mechanism is designed for price negotiation.

093-0265  Managing Multi-Rooming: Why Uniform Price is Uniformly Lower  
Yue Dai, Professor, Fudan University, China  

We derive and compare the firm’s prices and profits under the uniform and the dual pricing. An important finding is that the uniform pricing can outperform the dual pricing even with a price lower than both the online and offline prices which is very beneficial to the firm.

093-1942  Supply Chain Contracts for Biopharmaceutical Projects  
Yasemin Limon, Student, University of Wisconsin Madison, United States  
Tugce Martagan, Assistant Professor, Technische Universiteit Eindhoven, Netherlands  
Ananth Krishnamurthy, Professor, University of Wisconsin-madison, United States  

Biopharmaceutical R&D projects require multiple steps that involve high uncertainty and costs. Large biopharmaceutical companies may subcontract some of these steps to one or more small contract biomanufacturers to reduce risk and costs. We compare the performance of various contract designs for this supply chain.

093-1045  Using Transparency to Manage the Sourcing of Complex Non-Routinized Services  
Jacob Chestnut, Assistant Professor, Cornell University, United States  
Damian Beil, Professor, University of Michigan, United States  

Complex services (non-routine litigation) are often billed hourly, making it difficult for buyers and suppliers to identify/remove inefficient work. Instead, suppliers may truncate their bill to provide value. We consider an alternate mechanism: both parties proactively collaborate using detailed transparency about the buyer’s requirements and the supplier’s planned/completed processes.

093-1158  Managing Queues with Static Delivery Guarantees  
Mehdi Hosseinabadi Farahani, Student, University of Texas Dallas, United States  
Milind Dawande, Professor, University of Texas Dallas, United States  
Ganesh Janakiraman, Professor, University of Texas Dallas, United States  

We study the problem of managing queues in online food ordering services where customers are promised a common due-date lead time. The objective is to minimize the total earliness and tardiness costs incurred by the customers. Our results show that a threshold policy yields near-optimal solutions.

093-1184  Adoption and Abandonment: A Payment Channel Under Impacts of Price Incentives and Usage Features  
Shuai Ling, Assistant Professor, Tianjin University, China  
Shoufeng Ma, Professor, Tianjin University, China  
Kejia Hu, Assistant Professor, Vanderbilt University, United States  
Ning Jia, Professor, Tianjin University, China  

Our research is to evaluate the introduction of various payment channels; particularly to understand how monetary incentives and features of the payment channel alter consumers’ habitual behavior. The research uses 4-year transaction data including three payment methods: contactless smart card, debit card, and mobile payment.

093-0189  Drivers and Implications of Direct-Store-Delivery in Distribution Channels  
Mumin Kurtulus, Associate Professor, Vanderbilt University, United States  
Canan Savaskan-Ebert, Associate Professor, Southern Methodist University, United States  
Chunlin Wang, Assistant Professor, Davis College of Business and Economics, United States  

We consider a distribution channel where two competing manufacturers sell their products to the customers via a single shelf-space constrained retailer. We compare a conventional channel where the retailer is responsible for replenishments to a DSD channel where the retailer relies on the manufacturers to replenish the shelf-space.

093-1062  Supplier Selection Model for End-of-Life Product Recovery: An Industry 4.0 Perspective  
Ozden Tozanli, Student, University of Bridgeport, United States
Today's competitive market dynamics inevitably lead to changes in current business structures, requiring organizations to realign their long-term business strategies to accommodate technological innovations. Delineating the value of Industry 4.0 integration into the supplier selection problem, this study presents a goal programming (GP) model for product recovery operations.

**903-2108** Detection and Control Operations Management of an Agricultural Invader Through Integrated Simulation-Optimization

Sevilyal Onal, Student, New Jersey Inst of Technology, United States
Esra Buyuktahtakin Toy, Associate Professor, New Jersey Institute of Technology, United States
Jennifer Smith, Associate Professor, Wichita State University, United States
Gregory Houseman, Associate Professor, Wichita State University, United States

An aggressive invasive plant, Sericea, threatens biodiversity causing large economic damage in the Great Plains of the U.S. Using an integrated simulation-optimization model, we study trade-offs between detecting new random pop-outs and treating older already-detected patches. The model is calibrated using 3-year data collected in Kansas and Oklahoma.

**903-2285** Sharing Economy: Recent Trends and Issues in India

Nilakantan Narasinganallur, Associate Professor, KJ SIMSR, India
Kingsley Gnanendran, Professor, University of Scranton, United States

This paper's focus is on recent trends and issues of the sharing economy in India in the context of digitalization and technological advancement. We review the developments in the unorganized and private sectors of the sharing economy and cover problems faced by small businesses and policy actions from government authorities.

**903-2292** Quantitative Modeling Applications in the Indian Paper Industry

Nilakantan Narasinganallur, Associate Professor, KJ SIMSR, India
Ravindra Baliga, Assistant Professor, K.J Somaiya Institute of Management Studies & Research, India

We look at two models for sustainable paper-making viz. optimization modeling with environment costs and cutting stock model with automatic pattern generation. The industry is well established and poised for implementing the applications and efforts to engage with Indian paper manufacturers to adopt quantitative models.

**Saturday, 08:00 AM - 09:30 AM**

**167** Contributed Session: Data Analytics in Action

Chair(s): Raymond Major

**903-2449** Incentive Design for Operations-Marketing Multi-Tasking

Tinglong Dai, Associate Professor, Johns Hopkins University, United States
Rongzhu Ke, Assistant Professor, Hongkong Baptist University, Hong Kong
Christopher Ryan, Associate Professor, University of Chicago, United States

A firm hires a store manager to make operational and marketing efforts. The outputs -- demand and capacity -- face demand censoring. We show the optimal compensation plan is a base salary with bonus paid when a minimum level of inventory is sold out, or sales meets an inventory-dependent target.

**903-1550** The Effect of Capacity Risk on Price Competition with Customer Switching Cost

Junhyun Bae, Student, Cornell University, United States
Li Chen, Associate Professor, Cornell University, United States
Yao Cui, Assistant Professor, Cornell University, United States

We consider price competition between online retailers who face capacity risk of fulfilling orders in a market with consumer switching costs. We find that capacity risk mitigates price competition and the ability to price based on capacity realization leads to different implications for firms with high/low capacity risk.
Saturday, 08:00 AM - 09:30 AM

093-0775 Success Factors for Big Data Analytics in Manufacturing
Christopher Wunck, Professor, Emden/Leer University, Germany
The big data wave in the manufacturing industries presents many challenges for manufacturers. Production managers are encouraged to equip their machines with sensors and start acquiring data from their processes. This talk focuses on some prerequisites necessary for data mining and complex event processing technologies to deliver on their promises.

093-2264 Unsupervised Learning for Cybersecurity Management of Internet of Things Systems
Honggang Wang, Professor, ???, United States
IoT systems connect machines, humans, and service infrastructures with smart devices and computer networks. The cyber connection brings more security concerns particular for critical industrial or service systems. We develop new cybersecurity anomaly detection algorithms based on unsupervised learning and demonstrate the effectiveness using a water treatment plant case.

093-2197 STEM 2.0
Raymond Major, Associate Professor, Virginia Tech, United States
Roberta Russell, Professor, Virginia Polytechnic Institute And State University, United States
The jobs are there, well-paying, too. So why aren’t more students in STEM majors? STEM 2.0 and the balancing act between data and purpose. We’ll take a look at what can make STEM more attractive and if it will work.

093-0618 A Framework for Analyzing Influencer Marketing in Social Networks: Selection and Scheduling of Influencers
Rakesh Mallipeddi, Student, Texas A&M University College Station, United States
Subodha Kumar, Professor, Temple University, United States
Chelliah Sriskandarajah, Professor, Texas A&M University College Station, United States
Yunxia Zhu, Assistant Professor, University of Nebraska Lincoln, United States
Influencer marketing, which involves employing influential users of social media, is being increasingly employed by organizations to market/advertise their products. In this study, we propose an optimization framework for selection and scheduling of influencers to maximize the reach and effect of an advertisement.

093-1098 No One Trusts Emotional Women? Measuring the Impact of Discrete Emotions on Review Helpfulness
Zhe Shan, Assistant Professor, Miami University, United States
Wenqi Zhou, Assistant Professor, Duquesne University, United States
Georgiana Craciun, Assistant Professor, Duquesne University, United States
We examine the differential helpfulness of emotional WOM from female and male reviewers and test the moderating effects of contextual emotion. Two studies on three discrete emotions (happiness, anger, and anxiety) provide evidence for the influence of gender stereotypes on helpfulness ratings. Such gender stereotype effects vary among different emotions.

093-1590 Studying Quantity Discount and Market Share Contracts Under Congestion
Sumanta Singha, Assistant Professor, Indian School of Business, India
Rajib Saha, Assistant Professor, Indian School of Business, India
Subodha Kumar, Professor, Temple University, United States
Unlike in quantity discount contracts, discounts can be based on the share of demand the buyer allocates to the seller; typically known as market share contracts. We study and compare the optimal decisions of a strategic vendor facing congestion and price sensitivity under both types of contracts.

093-1083 Hiding Sensitive Information When Sharing Transactional Data
Abhijeet Ghoshal, Assistant Professor, University of Wisconsin-Milwaukee, United States
Syam Menon, Associate Professor, University of Texas Dallas, United States
Sumit Sarkar, Professor, University of Texas Dallas, United States
We propose a method to hide sensitive items before sharing transactional data with business partners when the dataset exists in a distributed format, and items are sensitive at both local and full dataset levels.

093-1138 The Role of Robustness in Inventory vs Timeliness Tradeoff in Project Delivery
Arman Jabbari, Student, University of California Berkeley, United States
Phil Kaminsky, Professor, University of California Berkeley, United States
We explore the tradeoffs between inventory holding costs and project completion times in a variety of settings, across single and multiple projects, and we analyze how robustness affects these tradeoffs.

093-1582 Scheduling the Timing of Product Introductions in the Automotive Industry
Rainer Kolisch, Professor, Technische Universitat Munchen, Germany
Christopher Bersch, Student, Technische Universitat Munchen, Germany
Renzo Akkerman, Associate Professor, Wageningen University, Netherlands

We are considering the scheduling of the start and end of production of car variants in order to optimize multiple criteria. We model the problem as MIP and present computational results as well as managerial insights using data from a major German automobile manufacturer.

093-1789 Use of Quality Functions in Project Scheduling in the Presence of Uncertainty
Bruce Pollack-Johnson, Associate Professor, Villanova University, United States
Matthew Liberatore, Professor, Villanova University, United States

In this paper, we use continuous quality functions, with quality as a nonlinear function of time and cost, to analyze trade-offs between time, cost, and quality in project scheduling in the presence of uncertainty. We show results using data from two real-life examples, utilizing stochastic programming, and simulation.

093-1996 Actual Running Time Variability in a Rural Transit System
Roger Solano, Professor, Slippery Rock University - School of Business, United States
Liang Xu, Associate Professor, Slippery Rock University - School of Business, United States

Automatic Vehicle Location data from a rural transit route and weather data are used to identify variability in actual running time. We analyze the adequacy of scheduled running times and scheduled recovery times. We also analyze sources of variability in the actual running times and make recommendations.

093-1110 An MILP Formulation for the Multi-Mode Resource-Constrained Project Scheduling Problem MRCPSP
Norbert Trautmann, Professor, University of Bern, Switzerland
Mario Gnagi, Student, University of Bern, Switzerland

We propose a novel MILP formulation for the MRCPSP based on variables representing the assignment of the project activities to individual resource units and the sequential relationships between activities that are assigned to at least one identical resource unit. The model exhibits advantageous performance for instances with long activity durations.

170 Saturday, 08:00 AM - 09:30 AM, Columbia 2
Track: Operational Excellence
Invited Session: Digital lean manufacturing
Chair(s): Matthias Thurer
093-2194 Small Businesses Find a Way
Barbara Hoopes, Associate Professor, Virginia Tech, United States
Roberta Russell, Professor, Virginia Polytechnic Institute And State University, United States

Workarounds, continuous improvements and innovations - small businesses find a way to survive. Stories from the front lines of the foundation of our economy and the heart of our communities.

093-1432 Exploring the Relationship Between Lean Project Management and Organizational Learning for Operational Success
Jane Dowson, Post Doc/Researcher, Liverpool John Moores University, United Kingdom
David Bryde, Professor, ???, United Kingdom
Christine Unterhitzenberger, Lecturer, Liverpool John Moores University, United Kingdom

Linking Lean Project Management and Organizational Learning offers a unique opportunity to discover how clusters of best practice can develop and emerge over time. We provide new insights into the utility and impact of this relationship as a viable change initiative to improve operational capacity, organizational capability, and success.

093-0568 Impact of Integrated Lean Manufacturing and Industry 4.0 Practices on Operational Performance
Sven Margraf, Student, Cardiff University, Germany
Maneesh Kumar, Professor, Cardiff University, United Kingdom
Andrea Chiarini, Managing Director, Chiarini & Associati, Italy

Industry 4.0 (4.0) encompasses a variety of technologies that are deemed to revolutionize Lean Manufacturing (LM). This paper investigates the operational performance impact of integrating hard LM practices and 4.0 technologies in the manufacturing industry. The findings indicate that low integration levels can already result in considerable operational performance improvements.

093-0155 Management Cybernetics: What can Industry 4.0 Learn from Card-Based Control Systems?
Matthias Thurer, Professor, Jinan University, China

Industry 4.0 relies on self-organized logistics, self-optimizing machines, etc. This challenges research often focused on analytical problems that prohibit feedback loops. Kanban is a cybernetic control system based on feedback loops. It is argued that it provides important insights into how to structure communication in the context of Industry 4.0.

171 Saturday, 08:00 AM - 09:30 AM, Columbia 3
Track: Healthcare Analytics
Contributed Session: Personalized Treatment and Care Delivery
Chair(s): Mark Van Oyen
093-2322 Dynamic Online Learning of Personalized Patient Progression in Chronic Diseases: Application to Glaucoma
Esmaeil Keyvanshokooh, Student, Industrial and Operations Engineering Department, United States
Mark Van Oyen, Professor, University of Michigan, United States
Mariel Lavieri, Assistant Professor, University of Michigan - Ann Arbor, United States
Christopher Andrews, Post Doc/Researcher, University of Michigan - Ann Arbor, United States
Joshua Stein, Assistant Professor, University of Michigan - Ann Arbor, United States
We develop new online learning algorithms for learning personalized patient progression in chronic diseases to alert clinicians and patients. Our Thompson sampling-based approach can handle large sets of covariates and we are able to incorporate the dynamic nature of disease progression. We identify the progression of Glaucoma.

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>Title</th>
<th>Authors</th>
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</table>
| 093-1483   | Integrating Physical Activity Information into Insulin Dosing Decisions in Type 1 Diabetes | Basak Ozaslan, Student, University of Virginia, United States
Stephen Patek, Professor, University of Virginia, United States
Marc Breton, Associate Professor, University of Virginia, United States |
| 093-2335   | Online Personalized Care Framework to Reduce Readmission Risk | Mohammad Zhailechian, Student, University of Michigan - Ann Arbor, United States
Esmaeil Keyvanshokooh, Student, University of Michigan - Ann Arbor, United States
Mark Van Oyen, Professor, University of Michigan, United States |
| 093-1059   | A Stochastic Modeling Approach for Planning Resources at Non-Operating Room Procedural Area | Joonyup Eun, Assistant Professor, Korea University, South Korea
Vikram Tiwari, Associate Professor, Vanderbilt University Medical Center, United States
Mitchell Tsai, Associate Professor, University Of Vermont Larner College Of Medicine, United States
Max Breidenstein, Clinical Research Assistant, University Of Vermont Larner College Of Medicine, United States
Warren Sandberg, Professor, Vanderbilt University Medical Center, United States |
| 093-1739   | A New Value Proposition for Reducing Readmissions: Dynamic Staffing for Post-Discharge Follow-up | Jonathan Helm, Assistant Professor, Kelley School of Business, United States
Alex Mills, Associate Professor, Baruch College, United States
Shanshan Hu, Assistant Professor, Indiana University Bloomington, United States
Sean Yu, Student, Indiana University, United States
Julian Pan, CEO, Lean Care Solutions Corp, United States |
| 093-1891   | Improving Itinerary Completion at a Destination Healthcare Institution | Jonathan Helm, Assistant Professor, Kelley School of Business, United States
David Kaufman, Assistant Professor, University of Michigan-Dearborn, United States
Pengyi Shi, Assistant Professor, Purdue University, United States
Mark Van Oyen, Professor, University of Michigan, United States |
| 093-1766   | Medicare Payment to Skilled Nursing Facilities: The Consequences of the Three-Day Rule | Feng (Susan) Lu, Associate Professor, Purdue University, United States |
093-1829 Managing Medical Item Inventories Under Order Loss
Ozden Cakici, Assistant Professor, American University, United States
In hospitals, order information for medical items go through multiple departments before being submitted to a medical supplier. At times, order information is inadvertently lost on the way, leading to order-loss. Using our case study at MRI units, we propose a periodic review policy and two technology features to mitigate/eliminate order-loss.

093-1321 The Impact of Full Capacity Protocol on the Operational Performance of an Emergency Department
Lu Wang, Student, University of Kansas, United States
Mazhar Arikan, Associate Professor, University of Kansas, United States
Suman Mallik, Associate Professor, University of Kansas, United States
The Full Capacity Protocol (FCP) is a set of guidelines that coordinate the patients flow when the emergency department (ED) is overcrowded. Utilizing data from a large urban teaching hospital, we characterize its impacts on the operational performance of the ED.

093-1249 Socially Optimal Contracting Between a Regional Blood Bank and Hospitals
Anand Paul, Associate Professor, University of Florida, United States
Tharanga Rajapakse, Assistant Professor, University of Florida, United States
Suman Mallik, Associate Professor, University of Kansas, United States
Motivated by the operational challenges faced by a Regional Blood Bank (RBB) in distributing the blood (and related products) among the hospitals in its service area, we study socially optimal contracting decisions of an RBB serving multiple hospitals.

093-1472 Financial Incentives Under CPC+
Elodie Adida, Associate Professor, University of California Riverside, United States
Fernanda Bravo, Assistant Professor, UCLA Anderson School of Management, United States
CMS launched the Comprehensive Primary Care Plus (CPC+) payment initiative, aiming at improving primary care delivery. Under CPC+, physicians are encouraged to use alternative care delivery methods (phone calls, e-visit, in-home nurse visits). We study how CPC+ impacts providers' care delivery decisions, patient welfare, and payer cost.

093-1509 Reference Pricing for Healthcare Services
Shima Nassiri, Assistant Professor, University of Michigan - Ann Arbor, United States
Elodie Adida, Associate Professor, University of California Riverside, United States
Hamid Maman, Associate Professor, University of Washington, United States
The traditional healthcare payment system does not incentivize hospitals to limit their prices. Reference pricing (RP) has been proposed as a way to better align incentives. Under RP, patients may be responsible for part of the cost. We propose a model to analyze RP.

093-0276 Are Disruptive Technologies Disrupting the Global Sourcing of Business Services?
Devashish Thakar, Student, University of South Carolina, United States
Sean Handley, Associate Professor, University of South Carolina, United States
Keith Skowronski, Assistant Professor, University of South Carolina, United States
The role of organizational experience in the vendor selection process has received insufficient attention in the sourcing literature. This study addresses this gap by examining the relationship between experience and vendor selection in the context of business services outsourcing. The moderating influence of disruptive technologies on this relationship is examined.

093-0639 Top Management Teams and Sustainability Performance: The Role of Temporal Orientation
Stephanie Eckerd, Assistant Professor, Indiana University Indianapolis, United States
Saif Mir, Assistant Professor, College of Charleston, United States
John-Patrick Paraskevas, Assistant Professor, Miami University, United States
Top management dictates organizational temporal orientation in strategic priorities and resource allocations. Temporal considerations are critical to sustainability issues as there are often time lags until their impact is realized. We evaluate the link between the functional composition of top management and organizational temporal orientation and impacts on sustainability performance.

093-1143 The Strategic Alignment Saga - Does Supply Chain Have to Be Aligned to Firm Strategy?
Piyush Shah, Student, Arizona State University, United States
Thomas Kull, Associate Professor, Arizona State University Tempe, United States
It is believed that under high (low) environmental uncertainty a combination of differentiation (cost focus) based firm strategy and responsive (efficient) supply chains yields high performance. In this paper, we empirically test this belief using secondary financial data. The results of polynomial regression do not support the traditional beliefs.

093-1485 The Effect of Supply Base Characteristics on Product Recalls
Yan Dong, Professor, University of South Carolina, United States
In this study, we use a unique data set to examine the role of characteristics of the supply base in product recalls. We find different effects of supply base characteristics.

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**Invited Session: Emerging Topics in Supply Chains**

**Chair(s):** Haresh Gurnani, Saibal Ray

**Saturday, 08:00 AM - 09:30 AM, Columbia 8**

**Track:** Supply Chain Management

**093-0851** Peer-to-Peer Sharing Platforms with Quality Differentiation: Manufacturer’s Strategic Decision Under Sharing Economy

Huiqi Guan, Assistant Professor, Fudan University, China
Xin Geng, Assistant Professor, University of Miami, United States
Haresh Gurnani, Professor, Wake Forest University, United States

We formulate a multi-stage game-theoretic model to analyze the manufacturer’s strategic move of building an exclusive product sharing platform to respond to the competition from the emerging peer-to-peer product sharing platforms in the downstream market. Our results indicate that a high-quality manufacturer can benefit from building a peer-to-peer sharing platform.

**093-1111** Service Provision in Distribution Channels

Haresh Gurnani, Professor, Wake Forest University, United States
Shubhranshu Singh, Assistant Professor, Johns Hopkins University, United States
Sammi Tang, Associate Professor, University of Miami, United States
Huaining Wang, Assistant Professor, Emporia State University, United States

This paper studies a manufacturer’s and a retailer’s incentive to invest in pre-sales service effort that reduces the consumers’ likelihood of seeking after-sales support for an inherently complex information-intensive product. The paper also examines the possibility of collaboration in which the manufacturer shares the retailer’s cost of providing pre-sales service.

**093-1262** Multi-Period Sourcing Decision Under Disruption Risks and Carbon Emission

Purushottam Meena, Associate Professor, New York Institute of Technology, United States
Shaya Sheikh, Assistant Professor, New York Institute of Technology, United States
Gopal Kumar, Assistant Professor, iim raipur, India

The paper aims to formulate mixed integer nonlinear programming optimization models to solve the problems of multi-period sourcing decisions considering carbon emission regulations and disruptions risk. We solved the problem using CLPEX method and have drawn several managerial insights.

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**Invited Session: Behavioral Operations Management**

**Chair(s):** Xiaobo Zhao, Wanshan Zhu

**Saturday, 08:00 AM - 09:30 AM, Columbia 9**

**Track:** Behavioral Operations Management

**093-1207** An Analysis of Empirical Newsvendor Decisions

Anna-Lena Sachs, Assistant Professor, University of Cologne, Germany
Michael Becker-Peth, Assistant Professor, Rotterdam School of Management, Netherlands
Stefan Minner, Professor, Technische Universitat Munchen, Germany
Ulrich Thonemann, Professor, University of Cologne, Germany

We analyze the ordering decisions of a manufacturer who faces a multi-product newsvendor problem with an aggregate service level constraint. The manufacturer broadly exhibits the same biases as subjects do in the laboratory and is prone to another bias that has not been identified before, that is, group aggregation.

**093-2164** The Effect of Preference on the Biased Perception of Randomness

Tim De Bree, Student, Erasmus University Rotterdam, Netherlands
Georg Granic, Assistant Professor, Erasmus University Rotterdam, Netherlands
Qingxia Kong, Assistant Professor, Erasmus University Rotterdam, Netherlands

The gambler’s fallacy is an erroneous belief in the negative correlations of independent outcomes generated by a random process. In a set of lottery games we found and thus hypothesized that there are less gambler’s fallacy betting behavior among preferred options. We test the hypothesis via experimental studies.

**093-2201** The Influence of Response Time in Supply Chain Bargaining

Thomas Vogt, Student, University of Cologne, Germany
Fadong Chen, Assistant Professor, Zhejiang University, China
Yingshuai Zhao, Assistant Professor, University of Cologne, Germany

The interaction in a supply-chain bargaining process produces a rich set of information including proposals, responses, and response time (RT). Most of the existing studies ignore the RT information, while recent studies in economics have shown that RT can reveal hidden information. This project is to fill the gap.

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**Invited Session: Managing Innovation and New Product Development**

**Chair(s):** Morvarid Rahmani

**Saturday, 08:00 AM - 09:30 AM, Columbia 10**

**Track:** Product Innovation and Technology Management
Saturday, 08:00 AM - 09:30 AM

093-1481 Knowledge Transfer From a Radical New Product Development Process to an Existing Product
Wenli Xiao, Assistant Professor, University of San Diego, United States
Cheryl Gaimon, Professor, Georgia Institute of Technology, United States
To alleviate the challenges of successfully developing a radical new product, a firm may choose to transfer a portion of the radical product knowledge to improve an existing product in portfolio. We introduce a dynamic model and provide conditions that drive a firm to undertake such knowledge transfer.

093-0760 Principal's Signaling of Private Information When Outsourcing its Product Development
Chunlin Wang, Assistant Professor, Davis College of Business and Economics, United States
Glen Schmidt, Professor, University of Utah, United States
Bo Van Der Rhee, Professor, Nyenrode University, Netherlands
When a new product development project is outsourced (to an agent) by a principal with inside information, the principal might want to signal this information to the agent. In a stage-gate setting, we compare the performances of contracts that allow various combinations of money transfers (signals).

093-0447 Start-Up Infrastructure and Product Development: An In-Depth Case Study
Berke Guzelsu, Student, Boston University, United States
Nitin Joglekar, Associate Professor, Questrom School of Business, United States
Developing a viable business plan after identifying a potential product is challenging for many start-ups. Using grounded theory building, we investigate the development of a start-up in the hobby games industry through the pre-release of their second product to understand start-up organizational infrastructure development and product development under start-up conditions.

093-1278 Team Size and Coordination in Knowledge-Intensive Projects
Morvarid Rahmani, Assistant Professor, Georgia Institute of Technology, United States
Many knowledge-intensive projects involve a group of team members who jointly work on the project. We study the trade-off between team members’ workload and need for coordination, and generate insights on the optimal team size and team structure.

179 Saturday, 08:00 AM - 09:30 AM, Columbia 11 Track: Inventory Management
Invited Session: Advances in Stochastic Inventory Theory
Chair(s): Alexandar Angelus

093-0166 Integrating Dynamic Pricing with Inventory Decisions Under Lost Sales
Qi Feng, Professor, Purdue University, United States
Siroong Luo, Associate Professor, Shanghai Univ. of Finance and Economics, China
George Shanthikumar, Professor, Purdue University, United States
Inventory-based pricing under lost sales is an important, yet notoriously challenging problem in the operations management literature. By refining to a class of intuitively appealing policies and applying the properties of stochastic functions, we propose a solution that yields close-to-optimal performance under very general conditions.

093-0964 A Deterministic Approximation of Inventory Systems with Sequential Probabilistic Service Level Constraints
Lai Wei, Student, University of Michigan - Ann Arbor, United States
Stefanus Jasir, Associate Professor, University of Michigan, United States
Linwei Xin, Assistant Professor, University of Chicago, United States
We consider a lost-sales inventory system with non-stationary demands, lead times, and sequential probabilistic service level constraints, which is notoriously difficult to optimize. We propose a simple base-stock policy, derived from a deterministic approximation of the analogous backorder counterpart, and show it is asymptotically optimal in the high service-level regime.

093-0858 Asymptotic Optimal Policies in Inventory Systems with Lead Time
Ganesh Janakiraman, Professor, University of Texas Dallas, United States
Qi Wu, Assistant Professor, Case Western Reserve University, United States
We study a systematic way of constructing asymptotically optimal policies. We apply it to two inventory problems, one is the lost-sale inventory system with a fixed leadtime; the other is a dual-sourcing problem. We show numerically that the new policies perform well for a wide range of parameters.

093-1181 Business Analytics for Intermodal Capacity Management
Long Gao, Assistant Professor, University of California Riverside, United States
The intermodal industry has long suffered from chronic network imbalance. We develop a unified framework that integrates container repositioning with load acceptance. We demonstrate that our approach can greatly reduce chronic network imbalance and improve operational efficiency.

093-0164 Optimal Control and Value of Reverse Logistics in Supply Chains with Multiple Flows of Product
Alexandar Angelus, Assistant Professor, Texas A&M University College Station, United States
Ozalp Ozer, Professor, 1984, United States
We study reverse logistics in a supply chain where each location can initiate regular, reverse, and expedited orders for product. We identify the structure of the optimal policy for the resulting stochastic, multi-stage inventory model with multiple flows of product. This optimal policy renders the model analytically and numerically tractable.
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<tr>
<th>Session Code</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>093-1568</td>
<td>Increasing Patient Engagement Through Shared Medical Appointments</td>
<td>Nazli Sonmez, Student, London Business School, United Kingdom</td>
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<td>Kamalini Ramdas, Professor, London Business School, United Kingdom</td>
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<td>Ryan Buell, Associate Professor, Harvard Business School, United States</td>
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<td>Through a randomized control trial, we examine the impact of shared medical appointments, in which a group of patients meet with a doctor simultaneously, on patient engagement during the appointment (such as making eye contact, engaging in the proceedings, and asking questions) and after (such as complying with prescribed medications).</td>
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<tr>
<td>093-1422</td>
<td>Identifying Perceived Customer Value for Wellness-Centric Features in Hospitality: Evidence From EEG Signals</td>
<td>Min Kyung Lee, Assistant Professor, Northern Illinois University, United States</td>
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<td>Aleda Roth, Professor, Clemson University, United States</td>
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<td>Oriana Aragon, Assistant Professor, Clemson University, United States</td>
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<td>This paper explores customers’ perceived value that is attributable to the presence or absence of wellness-centric offerings in a hotel room. In an experimental design we tested the contribution of wellness-centric offerings in value creation through an electroencephalogram (EEG) laboratory experiment with measured self-report and neural indices of “wanting.”</td>
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<tr>
<td>093-0591</td>
<td>Impact of Referral Decision Errors on Patient Outcome: A Case of Observation Unit</td>
<td>Temidayo Adepoju, Student, Questrom Business School, Boston University, United States</td>
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<td>Anita Tucker, Associate Professor, Boston University, United States</td>
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<td>Physicians face the challenge of deciding whether a patient should be discharged home or admitted to an inpatient-bed from the observation-unit. Errorneous decisions affect patient outcome and lead to capacity problems. Using over 15,000 patient-visits to an observation-unit, we study the impact of inaccurate decisions on readmission and LOS.</td>
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<td>093-0218</td>
<td>Role of the Private Sector After Disasters: The Case of Hurricane Harvey</td>
<td>Johanna Amaya Leal, Assistant Professor, Iowa State University, United States</td>
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<td>Christopher Faires, Student, Iowa State University, United States</td>
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<td>Research shows that diverse groups of the civic society play a major role in disaster response. This paper presents preliminary findings resulting from fieldwork on the role played by the private sector after Hurricane Harvey; one of the largest disasters that impacted the United States in September 2017.</td>
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<td>093-0505</td>
<td>Stay Dependent: Relational Strategies to Reduce Funding Uncertainty</td>
<td>Gloria Urrea, Post Doc/Researcher, Indiana University, United States</td>
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<td>Sebastian Villa, Assistant Professor, Universidad De Los Andes, Colombia</td>
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<td>Eric Quintane, Associate Professor, Universidad De Los Andes, Colombia</td>
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<td>Humanitarian organizations can follow two types of strategies to reduce funding uncertainty: a broad strategy by approaching multiple donors or a focused strategy by developing long-term relationships with selected donors. We argue that while both strategies reduce current uncertainty, only a relationally focused strategy reduces future uncertainty, which fosters diversification.</td>
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<td>093-1457</td>
<td>The Impact of Administration on Program Spending During Emergency and Development Aid</td>
<td>Telesilla Kotsi, Student, Kelley School of Business, United States</td>
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<td>Alfonso Pedraza-Martinez, Associate Professor, Indiana University, United States</td>
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<td>Maria Besiou, Professor, Kuehne Logistics University, Germany</td>
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<td>This study focuses on resource allocation using ten-year financial data of five country offices of a large humanitarian organization. Treating disasters as exogenous shocks, we examine how past administration spending, which enables the organization to build capacity and deliver services efficiently to beneficiaries, has an impact on current program spending.</td>
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<td>093-2310</td>
<td>A Study on the Social Media Network Ecosystem During Different Stages of Disaster</td>
<td>Minoo Modaresnejad, Assistant Professor, University of North Carolina Wilmington, United States</td>
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<td>Saba Pourreza, Assistant Professor, University of North Carolina Wilmington, United States</td>
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<td>Manoj Venjakumari, Associate Professor, University of North Carolina Wilmington, United States</td>
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<td>We conduct social media analysis and observe the role of various stakeholders in a disaster ecosystem. We applied service dominant logic to explain how participants in a disaster ecosystem co-create and share information shared across social media networks.</td>
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<tr>
<td>093-2060</td>
<td>Communities in the Crossfire: How Companies Can Do Well By Doing Good</td>
<td>Andres Jola-Sanchez, Assistant Professor, Mays Business School, Texas A&amp;M University, United States</td>
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<td>Alfonso Pedraza-Martinez, Associate Professor, Indiana University, United States</td>
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<td>We study the operational impact of social investments in war-torn areas. With data from Colombia, we assess firm performance after law compelled oil firms invest in host communities. We find that oil firms’ operating margin increased by 23%, social investments improved firms’ logistics and relations with communities.</td>
</tr>
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Predicting Human Discretion and Adjusting Algorithmic Prescriptions: A Large-Scale Field Experiment in Bin Packing

Jiankun Sun, Student, Northwestern University, United States
Haoyuan Hu, Technical Specialist, Alibaba Group, China

This paper suggests a comparison framework to try to find evidence that impacts knowledge transfer. It examines this by reporting on outputs from 13 case studies across two sectors, manufacturing and healthcare. We propose a framework for use by both industry and funding bodies.

Cooperative and Localized Investments in Hotel Franchising: Moderating Effects of Franchisee Dependence

Jie Zhang, Assistant Professor, University of Victoria, Canada
Benjamin Lawrence, Associate Professor, Georgia State University, United States
Liwu Hsu, Associate Professor, University of Alabama Huntsville, United States

We theorize and test the main and moderating effects of franchisee dependence on a hotel’s profitability considering the allocation of resources in cooperative, localized and online domains. We find that franchisee dependence contributes positively to hotel profitability and more importantly moderates the impact of resources allocated in different domains.

Dyadic Creation of Supply Chain Scenarios: Behavioral Study with Application to Brexit Scenarios

Shardul Phadnis, Associate Professor, Malaysia Institute for Supply Chain Inno, Malaysia
Nilin Joglekar, Associate Professor, Questrom School of Business, United States

Companies use scenario planning to make strategic decisions under deep uncertainty. When regulatory uncertainty affects multi-national supply chains, as experienced after the Brexit referendum, should companies develop scenarios with their supply chain partners? We propose potential dyadic (buyer-supplier) scenario creation, test them experimentally, and illustrate their applicability, using Brexit scenarios.

Call to Duty: Staffing Flexibility at a Restaurant Chain

Masoud Kamalahmadi, Student, Indiana University, United States
Qiuping Yu, Assistant Professor, Indiana University, United States
Yong-Pin Zhou, Professor, University of Washington, United States

Just-in-time scheduling has become ubiquitous, but controversial in the service industry in recent years. Using a rich dataset from a casual-dining restaurant chain, we empirically explore how just-in-time scheduling impacts worker productivity and then propose an analytical scheduling model to inform the firm whether and how to use just-in-time scheduling.

Curbing the Opioid Crisis: The Value of a Second Opinion in the Primary Care Setting

Katherine Bobroske, Student, Cambridge University, United Kingdom
Michael Freeman, Assistant Professor, INSEAD, Singapore
Lawrence Huan, Internal Medicine Physician, Cambridge University, United States

For the first time in over 50 years, mortality rates in the US decreased for two consecutive years, largely attributed to an increase in drug overdoses. We find evidence that having an early second opinion may be critical in curbing opioid use at its root: in the primary care office.

Predicting Human Discretion and Adjusting Algorithmic Prescriptions: A Large-Scale Field Experiment in Bin Packing

Jiankun Sun, Student, Northwestern University, United States
Dennis Zhang, Assistant Professor, Washington University St Louis, United States
Haoyuan Hu, Technical Specialist, Alibaba Group, China
Jan Van Mieghem, Professor, Northwestern University, United States

In logistics, optimization algorithms are deployed to empower humans, but humans’ execution may deviate from algorithmic prescriptions. In a field experiment on two bin-packing algorithms, we show that a human’s conformance with algorithm solutions and productivity could be improved by predicting discretionary behavior and adjusting algorithmic prescriptions in an optimization algorithm.

Behavioral Drivers of Routing Decisions: Evidence from Restaurant Table Assignment

Tom Tan, Assistant Professor, Southern Methodist University, United States
Bradley Staats, Professor, University of North Carolina Chapel Hill, United States

This paper presents new evidence on the effects of embeddedness (relational, structural, positional, and proximal) on transaction prices in the context of buyer-supplier relationships in a large, emerging market.
We analyze granular transaction data to examine how hosts revise a given routing rule when seating customers. After that, we empirically analyze the effect of the dispersion of table assignments on restaurant performance and estimate counter-factual sales’ impact of adopting an alternative routing priority.

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**184**  
Saturday, 08:00 AM - 09:30 AM, Jefferson East  
Track: Panels & Meetings  
**Contributed Session: Emerging Scholars 1**  
Chair(s): Goker Aydin

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**093-2433**  
Emerging Scholars 1  
Goker Aydin, Professor, Johns Hopkins University, United States  
This session is by invitation only. This program provides new university professionals in OM with career-building advice in developing excellence in their personal programs of teaching, research, and service. The program is highly interactive and features internationally recognized senior OM scholars as discussion leaders.

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**186**  
Saturday, 08:00 AM - 09:30 AM, Georgetown East  
Track: Supply Chain Risk Management  
**Invited Session: Business Model with Social Operations**  
Chair(s): Guangwen Kong

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**093-0631**  
Courteous or Crude? Understanding and Shaping User Behavior in Ride-Hailing  
Yunke Mai, Student, Duke University Durham, United States  
Bin Hu, Associate Professor, Naveen Jindal School of Management, United States  
Yuhao Hu, Student, Duke University Durham, United States  
Sasa Pekec, Associate Professor, Duke University Durham, United States  
Zilong Zou, Student, Duke University Durham, United States  
We adopt an evolutionary game model to investigate player behavior evolution in ride-hailing. We identify sustainable asymptotically stable equilibria and show how the platform could leverage operational tools to optimize its performance. We also show a platform may achieve social optimum by prioritizing high-rating riders in matching.

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**093-1040**  
Pricing and Capacity Decisions for Shared Service Systems Under Competition  
Wei Gu, Student, University of North Carolina Chapel Hill, United States  
H. Sebastian Heese, Professor, North Carolina State University, United States  
Eda Kemaloglu-Ziya, Associate Professor, North Carolina State University, United States  
Serhan Ziya, Associate Professor, University of North Carolina Chapel Hill, United States  
We consider service systems where customers’ utility depends on price as well as their service experience, which in turn depends on how crowded the service environment is and with whom the service environment is shared. We investigate how two such systems make pricing and capacity decisions under competition.

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**093-2187**  
Referral and Learning on Social Network: Implications for Inventory  
Guangwen Kong, Assistant Professor, University of Minnesota - Twin City, United States  
We consider a firm selling differentiated products to customers whose preferences are correlated in a social network. We investigate how the design of referral program and customer learning influence the demand distribution and therefore have an impact on the firm's inventory decision.

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**187**  
Saturday, 08:00 AM - 09:30 AM, Georgetown West  
Track: Retail Operations  
**Invited Session: Service strategies to win omnichannel consumers**  
Chair(s): Elliot Rabinovich

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**093-1190**  
Building a Winning Omnichannel Strategy: Overcoming Managers' Biased Perceptions of What Consumers Prefer  
Santiago Gallino, Assistant Professor, The Wharton School, United States  
Antonio Moreno, Associate Professor, Harvard University, United States  
Robert Roorderkerk, Associate Professor, Rotterdam School of Management, Netherlands  
We quantify to what extent managers have biased perceptions of what consumers want from online channels in an omnichannel system. We investigate two strategies to overcome these biases, the use of experts and leveraging the wisdom of crowds. Whereas the former seems hard, the latter shows a lot of promise.

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**093-2034**  
Impact of Customer Choice on Omnichannel Network Design  
Eva Ponce-Cueto, Associate Professor, Massachusetts Institute of Technology, United States  
Adriana Gabor, Associate Professor, United Arab Emirates Univ, Netherlands  
This paper discusses the impact customer preferences that delivery channels have on omnichannel distribution strategies. First, we design a survey to better understand consumer preferences in omnichannel. Secondly, we propose a network design model that connects these consumer preferences with different omnichannel distribution strategies.

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**093-1317**  
Buy Online, Fulfill From Store - Location Assignment and Order Picking  
wen zhu, Student, New Jersey Inst of Technology, United States  
Amanda Helminsry, Student, Mechanical & Industrial Engineering, United States  
Sanchay Das, Professor, Mechanical & Industrial Engineering, United States
Fulfilling online orders from store inventory is a growing retail strategy. In the nominal case, orders are picked from shelf inventory, for the advanced case, popular items are stocked in fast picking. Models to assign items to fast picking and schedule pickers to minimize order delays and costs are presented.

We draw from a quasi-natural experiment, conducted in partnership with an omnichannel grocery retailer, to examine how eliminating fulfillment fees for "Click & Collect" orders at retail stores, while maintaining fulfillment fees for home delivery is unchanged, affects consumers' shopping activity as well as the retailer's revenue and fulfillment costs.

Experience curves model the effects of organizational experience on the unit cost of production. We examine the effects of organizational experience on the consumption of utilities required for manufacturing. We consider both direct in-plant experience effects as well as potential cross-learning from related plants and interactions across utility types.

We theorize and empirically test the role of supplier base diversity in both industry and geographic locations on the supply chain governance. We evaluate the impact of different governance strategies on reducing carbon emissions.

The study examines the effect of Uber's entry on traffic flows under various contextual conditions.

We study the problem of jointly optimizing the price and order quantity of a perishable product to minimize the worst-case regret under demand ambiguity. We characterize the optimal decisions and study the impact of inventory risk on the optimal price. We demonstrate the advantages of our approach over existing ones.

The main purpose of this paper is to examine how a prevalence shipping policy in e-commerce – Membership Free Shipping (MFS), affects various aspects of consumers’ purchase behavior and retailer’s profit in both the short and long term. The results show that the MFS program is not always profitable.

Cryptocurrencies are popular instruments for funding startups. Source code of cryptocurrencies is publicly available on open source platforms and is an important source of information for investors. We study how different types of project development activities influence the price of cryptocurrency, and investigate actions which bring the highest price impact.

We study the impact of open source community on cryptocurrency market price: An empirical investigation.

We estimate demand stickiness due to rational inattention.

Saturday, 08:00 AM - 09:30 AM

Fulfilling online orders from store inventory is a growing retail strategy. In the nominal case, orders are picked from shelf inventory, for the advanced case, popular items are stocked in fast picking. Models to assign items to fast picking and schedule pickers to minimize order delays and costs are presented.

We draw from a quasi-natural experiment, conducted in partnership with an omnichannel grocery retailer, to examine how eliminating fulfillment fees for "Click & Collect" orders at retail stores, while maintaining fulfillment fees for home delivery is unchanged, affects consumers' shopping activity as well as the retailer's revenue and fulfillment costs.

Experience curves model the effects of organizational experience on the unit cost of production. We examine the effects of organizational experience on the consumption of utilities required for manufacturing. We consider both direct in-plant experience effects as well as potential cross-learning from related plants and interactions across utility types.

We theorize and empirically test the role of supplier base diversity in both industry and geographic locations on the supply chain governance. We evaluate the impact of different governance strategies on reducing carbon emissions.

The study examines the effect of Uber's entry on traffic flows under various contextual conditions.

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We estimate demand stickiness due to rational inattention.
Recent economics literature suggested that consumers may be rationally inattentive and not respond to small price changes. Using a large dataset consisting of eight years of grocery retail data, we estimate the magnitude of consumer inattention and demonstrate how the estimates vary with consumer demographics and product characteristics.
### Saturday, 09:45 AM - 11:15 AM

#### Remanufacturing Issues in Supply Chains
**Chair(s):** Philipp Dräger

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<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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| 093-0019 | Consumer Preferences Consider the Characteristics of Remanufactured Products | Juhong Gao, Associate Professor, Tianjin University, China  
Bing Lv, Student, Tianjin University, China |

The subject is driven by the remanufactured product attributes through the segmentation of the consumer market. The influence mechanism of cannibalization and consumers' willingness to pay for the remanufactured products is analyzed. Under the influence of product attributes, the conjugation effect between consumer purchase behavior and remanufacturing decision is researched.

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<th>Session</th>
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<th>Authors</th>
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| 093-1430 | Competition Between OEM and IR in Remanufacturing | Rainer Kleber, Assistant Professor, Universität Magdeburg, Germany  
Marc Reimann, Professor, University of Graz, Austria  
Gilvan Souza, Professor, Indiana University Bloomington, United States  
Weihua Zhang, Lecturer, University of Northumbria, United Kingdom |

An OEM competes with an independent remanufacturer (IR) in remanufacturing cores acquired from the current market. Customers pay a reduced price for remanufactured products by the IR. Cores acquisition cost differential is unclear. We analyze impacts of reduced prices and cores acquisition cost differentials on optimal decisions of OEM and IR.

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| 093-1672 | Circularity of Concrete - An Economic Analysis of Market Structure and Supply Chains | Philipp Dräger, Student, RWTH Aachen University, Germany  
Peter Letmathe, Professor, RWTH Aachen University, Germany |

The production of recycled concrete is economically not comparable to conventional concrete and hence recycled concrete is rarely used in building construction. We empirically examine differences in market structure and supply chains in different European countries to find indicators that increase the use of recycled concrete and close the loop.

#### Pricing Strategies
**Chair(s):** Chen Hu

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<tr>
<td>093-0267</td>
<td>Opportunity or Threat: The Role and Pricing Strategy of E-books</td>
<td>Quan Li, Student, University of Science and Technology of China, China</td>
</tr>
</tbody>
</table>

We build a joint e-book and printed book pricing model with risk-averse consumers which consider reading experience production costs and uncertainty in content valuation. We find that the introduction of e-books is generally beneficial to publishers. Surprisingly, both the sales and profits of the printed book may increase.

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<th>Session</th>
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| 093-0946 | Pricing Strategy and Campaign Design in Flight Crowdfunding: A Creative Way to Sell Flight Tickets | Zhihao Zhang, Student, University of Science and Technology of China, China  
Luyi Ling, Associate Professor, University of Science and Technology of China, China |

This paper analyzes a novel selling strategy for airlines termed "flight crowdfunding", whereby the flight will be implemented if the total amount pledged reaches a predetermined threshold. We provide an implementable model to describe the process. Our research underscores that crowdfunding might be even more attractive than previously thought.

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<td>093-0519</td>
<td>Dynamic Pricing with Demand Uncertainty: A Learning Approach Under Minimax Regret</td>
<td>Ruijing Wu, Student, Shanghai Jiao Tong University, United States</td>
</tr>
</tbody>
</table>

We consider a monopoly seller that sets the price of a new product dynamically. At the beginning of the selling season, the seller knows only the customer valuation support and has no information about the valuation distribution. By observing customer purchase actions, the seller continuously learns the customer valuation.

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| 093-2456 | Markdown Pricing or Trade-up Program? Demand Management with a Product Rollover | Yongbo Xiao, Associate Professor, Tsinghua University, China  
Chen Hu, Student, Tsinghua University, China  
Qian Liu, Associate Professor, Hong Kong University of Science and Technology, Hong Kong |

We consider the pricing and timing decisions of two strategies: markdown pricing and trade-up program, both of which play important roles in demand management with a product rollover.

#### Operations and Sports Management
**Chair(s):** Konstantin Pavlikov

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| 093-0268 | Operations and Sports Management | David Bamford, Professor, University of Huddersfield, United Kingdom  
Benjamin Dehe, Reader, University of Huddersfield, United Kingdom  
Iain Reid, Reader, Manchester Metropolitan University, United Kingdom  
Jim Bamford, Senior Lecturer, University of Huddersfield, United Kingdom |

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### Markdown Pricing or Trade-up Program? Demand Management with a Product Rollover

- **Authors:** Yongbo Xiao, Associate Professor, Tsinghua University, China  
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  Chen Hu, Student, Tsinghua University, China  
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We consider the pricing and timing decisions of two strategies: markdown pricing and trade-up program, both of which play important roles in demand management with a product rollover.
We investigated the opportunities that exist to engage in applying core Operations Management techniques within the sports sector and have arranged this around three areas: (1) Past history; (2) Present situation; (3) Future projections and opportunities. Recommendations for researchers and practitioners are made.

**093-2202 Proposal for a Strategic Planning Model for Brazilian Soccer Teams**

Vivian Cristina Souza, Student, Federal University of Juiz-de-Fora, Brazil
Luiz Dias Alves, Professor, Universidade Federal De Juiz De Fora, Brazil

Soccer is the most widespread sport in Brazil. Despite this, its great potential has not been taken advantage of in the best way. Researchers point to the absence of professional management as one of the main reasons, which makes it difficult to use fully efficient methodologies such as Strategic Planning.

**093-1313 Algorithms and Software for the Golf Director Problem**

Donald Hearn, Emeritus Professor, University of Florida, United States
Giacomo Benincasa, Senior Software Developer, Optym, United States
Konstantin Pavlikov, Assistant Professor, University of Southern Denmark, Denmark

The golf director problem is a sports management problem that aims to find an allocation of players into fair teams. This study discusses the notion of fairness, provides a solution methodology for team design, and presents websites with a variety of controls to manage and run club golf competitions.

**093-0765 A Model of Queue-Scalping**

Luyi Yang, Assistant Professor, Johns Hopkins University, United States
Shiliang Cui, Assistant Professor, Georgetown University, United States

This paper studies an emerging business phenomenon referred to as queue-scalping. A queue-scalper has no interest for the service being offered but proactively enters the queue in hopes of selling his spot later. We find that a more congested service system might be a less lucrative environment for scalping.

**093-1571 Efficient Inaccuracy: User-Generated Information Sharing in a Queue**

Jianfu Wang, Assistant Professor, Nanyang Technological University, Singapore
Ming Hu, Professor, University of Toronto, Canada

We study a service system which does not have the capability of monitoring and disclosing its real-time congestion level. However, the customers can observe and post their observations online and future arrivals can take into account such shared information when deciding whether to go to the facility.

**093-0389 Optimizing Large On-Demand Service Systems as Closed Queuing Networks**

Robert Hampshire, Associate Professor, Public Policy, United States
Qi Luo, Student, University of Michigan, United States
Shukai Li, Student, University of Hong Kong, Hong Kong

We study the rebalancing and pricing problems in large-scale on-demand service systems like microtransit, ride-hailing, and temporary staffing. By using efficient approximation methods, we can compute the mean performance measures in a closed queuing network with mild computational complexity.

**093-1404 Service Delivery Platforms: Pricing and Revenue Implications**

Pnina Feldman, Assistant Professor, Boston University, United States
Andrew Frazelle, Assistant Professor, University of Texas Dallas, United States
Robert Swinney, Associate Professor, Duke University Durham, United States

Platforms for restaurant delivery provide order-taking and delivery services connecting customers and restaurants. We consider how platforms should structure their relationships with service providers and compare the performance of different contractual forms when selling to rational customers. We analyze a queueing model where customers trade off rewards and waiting costs.

**093-0246 Package Size and Pricing Decisions with a Bulk Sale Option**

Dorothee Honhon, Associate Professor, University of Texas Dallas, United States
Ismail Kirci, Student, University of Texas Dallas, United States
Alp Muharremoglu, Associate Professor, Amazon.com, United States

We investigate the package size and pricing decisions of a retailer selling a perishable product in packages of a fixed pre-set size or in bulk and study the impact of these decisions on the retailer’s profit and waste at the consumer level.

**093-0942 Strategic Implications of Store Brands on Contracting Sequence**

Hongseok Jang, Student, University of Florida, United States
Quan Zheng, Associate Professor, University of Science and Technology of China, China
Saturday, 09:45 AM - 11:15 AM

197 093-0347 A Retail Perspective on Social Labeling
Xiajun Pan, Assistant Professor, University of Florida, United States
Quan Zheng, Associate Professor, University of Science and Technology of China, China
Asoo Vakaria, Professor, University of Florida, United States

Labeling, as a means of communicating corporate social performance, is well accepted by consumers and most consumer products are sold through common independent retailers. We study social labeling in a channel setting from the perspective of a profit-driven retailer and compare the results with that of impact-motivated non-profit organizations.

197 093-0534 Collaborative Decision Making in Demand Forecasting
Violina Sarma, Student, Cardiff University, United Kingdom
Anthony Beresford, Professor, Cardiff University, United Kingdom
Emrah Demir, Senior Lecturer, Cardiff University, United Kingdom

Demand forecasting requires crucial decisions to be made to tackle today’s uncertainty. These decisions depend on the structure of business hierarchies within organizations. We present a framework for collaborative decision-making in different business hierarchies. The framework incorporates information sharing, power, time pressure, and social value as key constructs of decision-making.

197 093-2152 Decision Making Approaches of Online Auction Based on the Focus Point
Yonggang Li, Assistant Professor, Dalian University of Technology, China
Xiangpei Hu, Professor, Dalian University of Technology, China
Xiaochun Feng, Student, Dalian University of Technology, China

We consider an online auction with permanent buyout options and propose a new model based on focus points to illustrate the decision making procedure. Different people are described by different types of focus points. The optimal strategy is obtained and it fits the decision procedure of human being intuitively.

198 093-1120 The Influence of Executive Cognitive Interpretation and Organizational Innovation: Evidence from the Healthcare Sector
Richard Rodriguez, Student, University of Texas Rio Grande Valley, United States

Healthcare executives exert major influence over innovation initiatives in healthcare products and process changes. This study examines the extent to which cognitive interpretation schema impact healthcare firm's large and small scale innovation activities. The cognition-behavior model examined forwards the degree of environmental munificence as a moderating variable.

198 093-1406 The Role of Physician Mobility on Hospital and Physician Performance
Bogdan Bichescu, Associate Professor, University of Tennessee Knoxville, United States

Driven by the ongoing transformation of healthcare, hospitals are increasingly seeking to financially align their hospital-affiliated physicians. Using secondary data and regression analysis, this research aims to understand the benefits and limitations of hospital employment of physicians, for both hospitals and physicians, as a function of various contextual factors.

199 093-0691 Dynamic Portfolio Management in Inventory Financing: A Copula Based Approach
Abdulaziz Al-Samarrai, Assistant Professor, King Fahd University of Petroleum and Minerals, Saudi Arabia
Emrah Demir, Assistant Professor, Cardiff University, United Kingdom

Portfolio management is widely used to mitigate risks of fluctuating asset prices. Taking advantage of Copula models and their time-series dependence structure, we investigate how a Logistics Service Provider could manage its inventory financing risk by employing the strategy of dynamic portfolio management with Copula models.

199 093-1291 Effect of Funding Target on Crowdfunding Failure
Joyaditya Laik, Student, University of Pittsburgh, United States

The retailer determines whether to introduce a store brand as well as the contracting sequence with two national brands. Although simultaneous contracting is better without store brands, their presence could lead to a cooperation behavior between the national brands in simultaneous contracting, such that the retailer would prefer sequential contracting.
The time (and failure) to deliver promised rewards to backers in a crowdfunding campaign is correlated to the degree by which the raised amount exceeds the targeted amount. We build an analytical model to identify thresholds for demand beyond which deliveries get delayed or fail altogether.

093-0123 Fixed Asset Register Accuracy in Aviation Operations
Dan Bumblauskas, Associate Professor, University of Northern Iowa, United States
Paul Bumblauskas, President, PFC Services, Inc., United States
Amy Igou, Assistant Professor, University of Northern Iowa, United States
Ben Vaske, Student, University of Northern Iowa, United States
Kayla Hahn, Student, University of Northern Iowa, United States

Asset record keeping, equipment maintenance, and life cycle costing are of the utmost importance in financial and accounting operations. This research project addresses a Six Sigma consulting case study on fixed asset register entry for aviation operations from a large European airport including recommendations for operations management staff.

093-1656 The Dark Side of Servitization: Shareholder Value Effects of Service Provision
Antonios Karatzas, Lecturer, University of East Anglia, United Kingdom
George Daskalakis, Lecturer, University of East Anglia, United Kingdom
Mark Johnson, Associate Professor, Warwick University, United Kingdom
Marko Bastl, Assistant Professor, Marquette University, United States

We investigate the shareholder reaction to new deal announcements for the provision of different types of services in terms of their risk profile. Our analysis indicates that while pure product sales and low-risk service provision creates value for shareholders, this is not the case for medium- and high-risk service provision.

093-1547 Life-Cycle Cost-Benefit Analysis Algorithm for Equipment Replacement with an App for Decision Making Tool
Askar Choudhury, Professor, Illinois State University, United States
Nathan Hartman, Associate Professor, Illinois State University, United States
Ted Coussens, Senior Lecturer, Illinois State University, United States

Computational algorithm is designed to assist practitioners in making cost-effective decision to upgrade existing technology through replacement. Relevant costs are utilized to select the best alternative between immediate replacements of existing technology or delaying by applying life-cycle cost analysis. An off-the-shelf “app” is created to implement the algorithm.

093-1644 Digitalising Procurement in the UK Fresh Potato Supply System for Wastage Mitigation
Naoum Tsolakis, Post Doc/Researcher, Cambridge University, United Kingdom
Mukesh Kumar, Lecturer, University of Cambridge, United Kingdom
Jagjit Singh Srai, Reader, University of Cambridge, United Kingdom

In the UK around two-thirds of all produced fresh potatoes is wasted mainly due to mismatch between production and consumption expectations. This research maps the end-to-end potato supply chain and identifies digital interventions to address waste/losses hot-spots. The interplay between data and technology archetypes, along with network configurations, is explored.

093-1677 The Role of Collaborative E-Sourcing in Supply Chain Digitalization Scenarios: A Gamification-Enabled Structural Model
Ettore Settanni, Post Doc/Researcher, Institute for Manufacturing, United Kingdom
Jagjit Singh Srai, Reader, Institute for Manufacturing, United Kingdom

We evaluate e-sourcing in the wider context of potentially interrelated supply chain digitalization scenarios. Paired capabilities covering inbound, internal, outbound, and end-to-end are evaluated by experts through an online gamification-enabled platform. Scenario categorization, based on structural modeling, elevates their consideration beyond the single instance in which they are normally evaluated.

093-1562 Exploratory Multiple Case Study on Managers’ Mental Models Regarding Digitalization of Procurement
Harri Lorentz, Associate Professor, University of Turku, Finland
Anna Aminoff, Assistant Professor, HANKEN SCHOOL OF ECONOMICS, Finland
Riikka Kaipia, Senior Lecturer, Aalto University School of Science, Finland
Jagjit Singh Srai, Reader, University of Cambridge, United Kingdom

In order to explore managers’ mental models regarding digitalization of procurement, mapping exercises were conducted in eight large firms in Finland. The interview data was analyzed by using the CIMO-framework (context-intervention-mechanism-outcome). Through a cross-case analysis, a set of second-order mechanisms for digitalization outcomes in procurement was identified and elaborated.

093-1650 Panel: Trends and Industry Perspectives with Big Data and Analytics
Norma Harrison, Professor, Macquarie University, Australia
Xiande Zhao, Professor, China Europe International Business School, China
Delton Aneato, Senior Director, IT Strategy Architecture & Planning (Americas), Brightstar, United States
Thomas Choi, Professor, Arizona State University Tempe, United States
Saturday, 09:45 AM - 11:15 AM

The global market will demand platforms that help companies govern and secure big data while empowering managers to analyze the data and help them make fact-based decisions. This session will present a panel of leading managers and academics to discuss the latest developments and trends in Big Data and Analytics.

201 Saturday, 09:45 AM - 11:15 AM, Fairchild East
Invited Session: Healthcare Operations
Chair(s): Fernanda Bravo

093-0244 An Integrated Prediction and Optimization Model for Staffing
Kimia Ghabadi, Assistant Professor, Johns Hopkins University, United States
Eric Hamrock, Senior Project Administrator, Stochastic, United States
Scott Levin, Associate Professor, Johns Hopkins University, United States
Sauleh Siddiqui, Assistant Professor, Johns Hopkins University, United States

We present an integrated short-term staffing model that utilizes a patient-census prediction simulation to inform a series of optimization problems. The model finds an optimal staffing assignment that is robust against patient variability and the uncertainty in the prediction simulation. The model is tested on a General Hospital's medical-surgical unit.

093-0903 When to Set the Next Appointment of Patients Suffering from Treatment-Resistant Depression
Martin Cousineau, Assistant Professor, Hec Montreal, Canada
Joelle Pineau, Professor, Mcgill University, Canada
Vedat Verter, Professor, Mcgill University, Canada
Gustavo Turecki, Professor, Douglas Mental Health University Institute, Canada

Deciding on the timing between appointments is an important decision due to the trade-off between high- and low-frequency appointments. Using imitation learning methods on real data, we characterize how this decision is made at an outpatient clinic treating patients suffering from treatment-resistant depression.

093-2136 Machine Learning to Address Hospital Capacity: Predicting Discharges and Identifying Opportunities to Increase Efficiency
Taghi Khaniyev, Post Doc/Researcher, Sloan School of Management, United States
Kyan Safavi, Connected Health Innovation Fellow, Massachusetts General Hospital, United States
Jonathan Zanger, Student, MIT Sloan School of Management, United States
Retsef Levi, Professor, MIT, United States
Peter Dunn, Assistant Professor, Massachusetts General Hospital, United States

We implemented a machine learning model using clinical data from 20,745 patients to identify candidates for discharge and the barriers to successfully transitioning them out of hospital. The model achieved an average AUC of 0.87 and identified an estimated 128 savable bed-days, among other results, during the 90-day study period.

202 Saturday, 09:45 AM - 11:15 AM, Fairchild West
Invited Session: Marketplace Innovations and Operations
Chair(s): Guangwen Kong, Heng Zhang

093-2171 The Value of Price Discrimination in Large Random Networks
Jial Huang, Student, University of Minnesota, United States
Ankur Mani, Assistant Professor, University of Minnesota, United States
Zizhuo Wang, Assistant Professor, University of Minnesota, United States

We study the value of price discrimination in large random networks. We find, surprisingly, that the value of such pricing policies in very large random networks are often not significant. We provide the exact rates at which this value grows in the size of the network.

093-2226 Consumer Information Sharing in a Distribution Channel
Buqing Ma, Student, University of Science and Technology of China, China
Guang Li, Assistant Professor, Queen's University, Canada

We study the optimal management strategy of an online retailer's customer information sharing system and investigate the effect of the retailer's strategy on the manufacturer's quality decision and consumer surplus in a distribution channel that consists of a manufacturer, an online retailer, and consumers with heterogeneous product valuations.

093-2341 The Leverage From Family and Friends: Managing Outside Funds in a Crowdfunding Campaign
Behrooz Pourghannad, Student, University of Minnesota, United States
Guangwen Kong, Assistant Professor, University of Minnesota, United States
Laurens Debo, Associate Professor, Dartmouth College, United States

We study how an entrepreneur's use of social network inflouses the crowdfunding campaign. We investigate how the investment from family and friends may impact the amount of investment that the entrepreneur could seek and how reciprocities can change the information flow.

093-2326 Position Ranking and Auctions for Online Marketplaces
Heng Zhang, Student, University of Southern California, United States
Leon Chu, Associate Professor, USC, United States
Hamid Nazerzadeh, Assistant Professor, University of South California, United States

Online e-commerce platforms such as Amazon and Taobao connect thousands of sellers and consumers every day. In this work, we study how such platforms should rank products displayed to consumers and utilize the top and most salient slots, under a framework based on consumer search.
Saturday, 09:45 AM - 11:15 AM

203

Invited Session: Field Experiments in Sustainable Operations Management
Chair(s): Andre Calmon

093-0381 Indian Agriculture Aggregation Service Experiment
Chris Parker, Assistant Professor, Penn State University
University Park, United States
We describe a field experiment evaluating the impact of a new business on Indian agriculture outcomes of interest.

093-0941 Running an SMS-Based Field Experiment in Tanzania: Stories from the Field
Jason Acimovic, Assistant Professor, Penn State University State College, United States
Christopher Parker, Assistant Professor, Penn State University University Park, United States
David Drake, Assistant Professor, University of Colorado Boulder, United States
Karthik Balasubramanian, Assistant Professor, Howard University, United States
In 2016, we ran a field experiment in Tanzania with mobile money agents. One treatment was whether agents received training; another was the nature of the daily SMS each agent received. In this discussion, we talk about the logistics and realities of the field experiment.

Retsef Levi, Professor, MIT, United States
Somya Singhvi, Student, Massachusetts Institute of Technology, United States
Yanchong Zheng, Associate Professor, Massachusetts Institute of Technology, United States
In this work, we collaborate with an app that pools farmers’ produce and transports it to wholesale markets in India. We first predict prices and then solve a network optimization model to maximize farmer revenue across the network. Finally, we propose a field experiment to test the model’s effectiveness.

093-1693 A Mobile-App Based Intervention to Improve Infant Nutrition in Underprivileged Indian Communities
Alp Sungu, Student, London Business School, United Kingdom
Kamalini Ramdas, Professor, London Business School, United Kingdom
Improving infant nutrition is a global challenge. We collaborate with a mobile app provider that offers nutrition content to parents in poor Indian communities. We will conduct a field experiment to test how aspiration and assortment of subsidized products can affect infant health and the shopping behavior of the poor.

093-1719 Effective Distribution Models for the Base of the Pyramid
Olumurejwa Fatunde, Student, Massachusetts Institute of Technology, United States
Andre Calmon, Assistant Professor, INSEAD, France
Joann de Zegher, Assistant Professor, MIT, United States
Gonzalo Romero, Assistant Professor, University of Toronto, Canada
We partner with Essmart, a social enterprise distributing life-improving durable goods to Base of the Pyramid (BoP) consumers in India, to gather data and examine the current behavior of BoP retailers. Our goal is to conduct a field experiment to test the effectiveness of various distribution models.

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Invited Session: Retail Operations and Online Advertising
Chair(s): Sajad Modaresi

093-0199 Dynamic Pricing Under a Static Calendar
Will Ma, Student, Massachusetts Institute of Technology, United States
David Simchi-Levi, Professor, Massachusetts Institute of Technology, United States
Jinglong Zhao, Student, Massachusetts Institute of Technology, United States
From our collaborations with a large Consumer Packaged Goods company, they deem it operationally beneficial to plan out a deterministic price calendar in advance. Motivated by this, we study dynamic pricing and assortment problems under a static calendar, and propose constant-factor approximation heuristics to show its efficacy.

093-0594 Shapley Meets Uniform: An Axiomatic Framework for Attribution in Online Advertising
Omar Besbes, Associate Professor, Columbia University, United States
Antoine Desir, Assistant Professor, INSEAD, France
Vineet Goyal, Associate Professor, Columbia University, United States
Garud Iyengar, Professor, Columbia University, United States
Raghav Singal, Student, Columbia University, United States
We develop an axiomatic framework for attribution in online advertising. Under a Markovian model for user behavior, we illustrate limitations of existing heuristics and propose a novel framework motivated by causality and game theory. Furthermore, we establish that our framework coincides with an adjusted “unique-uniform” attribution scheme.

093-1163 Inventory Integration with Rational Consumers
Arian Aflaki, Assistant Professor, Joseph M. Katz Graduate School of Business, United States
Robert Swinney, Associate Professor, Duke University Durham, United States
We study the value of inventory integration for firms selling seasonal goods to rational consumers who consider whether and when to visit based on their cost of visiting the firm, the price of the product, and its anticipated availability. We derive conditions under which this value is largest and smallest.

093-0202 Attribute-Based Modeling of Product Recommendations
Sajad Modaresi, Assistant Professor, University of North Carolina Chapel Hill, United States
Fernando Bernstein, Professor, Duke University Durham, United States
Denis Saure, Assistant Professor, Universidad De Chile, Chile

We study efficient real-time data collection approaches for an online retailer that dynamically personalizes assortments based on customers' attributes. We propose policies that leverage transaction data of customers with similar attributes to expedite the learning process and maximize revenue. We test the performance using a dataset from a Chilean retailer.

093-0205 Saturday, 09:45 AM - 11:15 AM, Cardozo
Track: Data Science
Invited Session: Tutorial: Learning with Side Information, by Professor Vivek Farias
Chair(s): Zeyu Zheng

093-2411 Tutorial: Learning with Side Information
Vivek Farias, Associate Professor, Massachusetts Institute of Technology, United States

Tutorial

093-0206 Saturday, 09:45 AM - 11:15 AM, Coats
Track: Social Media and Internet of Things
Contributed Session: Tutorial: Promote Sustainability Through Sensors and Cloud Computing
Chair(s): Andrew Whinston

093-2439 Promote Sustainability Through Sensors and Cloud Computing
Andrew Whinston, Professor, The University of Texas at Austin, United States
Cenying Yang, Student, The University of Texas at Austin, United States

We propose a framework of promoting sustainability through Internet of Things and cloud computing. We explore how technology could help grocery retailers to better distribute food, and thus reducing food waste. We demonstrate how to monitor ripeness of fresh produce using raspberry pi, sensors and cloud.

093-0207 Saturday, 09:45 AM - 11:15 AM, Columbia 1
Track: Scheduling and Logistics
Invited Session: Theoretical Models in Scheduling and Logistics
Chair(s): Gopalakrishnan Easwaran

093-1478 Estimation of Disaggregated Freight Flows via a Real-Valued Genetic Algorithm
Javier Rubio-Herrero, Assistant Professor, St. Mary'S University, United States
Jesús Muñuzuri, Professor, Universidad De Sevilla, Spain

We introduce a method for estimating disaggregated commodity flows when only aggregated data per origin-destination (OD) pair are provided. We use a doubly-constrained gravity model that is calibrated with a genetic algorithm. We apply this method to the case of the interregional transportation of ten different products in Spain.

093-1867 Distribution of Permutation Flowshop Sequences
Rafael Moras, Professor, St. Mary'S University, United States
Paul Uhlig, Professor, St. Mary's University, United States
Gopalakrishnan Easwaran, Associate Professor, St. Mary'S University, United States

We investigate the conditions for which the population of sequences (or subsets of such population) in a permutation flowshop are asymptotically normal. The performance measure considered includes makespan, mean flowtime, and mean lateness. Randomly structured and special cases of machine and job domination are considered.

093-1953 Antithetic Sequences in Flowshop Scheduling: Special Cases of Monster-Cell Dominance
Paul Uhlig, Professor, St. Mary'S University, United States
Rafael Moras, Professor, St. Mary'S University, United States
Gopalakrishnan Easwaran, Associate Professor, St. Mary'S University, United States

The effects monster cell of dominance in flow shop scheduling with minimization of mean lateness and makespan are described. Insights into this type of dominance and its effect on the behavior of antithetically related sequences (a sequence and its reverse) are discussed.

093-2175 Performance Evaluation of Traditional, Cross-Channel, and Multi-channel Logistics Network Configurations
Gopalakrishnan Easwaran, Associate Professor, St. Mary's University, United States
Tarik Gulbas, Student, St. Mary's University, United States
Rafael Moras, Professor, St. Mary's University, United States

Considering a three-echelon logistics network characterized by multiple products, time-varying demand, transportation lead-times, multiple modes of transportation, forward and reverse flows, and single- or multi-sourcing restrictions, we compare the traditional, cross-channel and multi-channel logistics network configurations with respect to a selected set of SCOR performance metrics.
Saturday, 09:45 AM - 11:15 AM

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Saturday, 09:45 AM - 11:15 AM, Columbia 2
Track: Operational Excellence

Invited Session: Tutorial: Industry 4.0 and Digitization of Manufacturing
Chair(s): Fabrizio Salvador

093-2407 Industry 4.0 and Digitization of Manufacturing
Fabrizio Salvador, Professor, IE BUSINESS SCHOOL, Spain
This session will provide an overview of Industry 4.0 and digitization of manufacturing.

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Saturday, 09:45 AM - 11:15 AM, Columbia 3
Track: Healthcare Analytics

Contributed Session: Improving Healthcare Service Delivery
Chair(s): Yucheng Chen

093-0808 A Unified Framework for Preventive Healthcare Service Design: Patient-Physician Collaboration
M Gabriela Sava, Assistant Professor, Clemson University, United States
Jerrold May, Professor, University of Pittsburgh, United States
Jennifer Shang, Professor, University of Pittsburgh, United States
Luis Vargas, Professor, University of Pittsburgh, United States
James Dolan, Professor, University of Rochester, United States

As patients are increasingly becoming active participants in making their medical decisions, healthcare providers are increasing their focus on patient-centered care. We propose a new service design for shared decision-making, which incorporates analytically both patients’ preferences and physicians’ expertise into a joint patient-physician model to assess, aggregate, and synthesize preferences.

093-2106 Analyzing the Impact of FDA-Approved Chemotherapy Agents on Clinical Practice
Alireza Boloori, Student, Arizona State University Tempe, United States
John Fowler, Professor, Arizona State University Tempe, United States
Srirmathy Mohan, Associate Professor, Arizona State University Tempe, United States
Mohan Gopalakrishnan, Associate Professor, Arizona State University Tempe, United States
Alan Bryce, Assistant Professor, Mayo Clinic, United States

Using a data set of patients who receive chemotherapy at Mayo Clinic, we develop a simulation model with a process-mapping approach to identify sources of system’s waste, including (1) inefficient scheduling for staff/patients, (2) unnecessary waiting time for patients, and (3) not effectively and efficiently utilizing staff skills.

093-0951 Medication Therapy Management Services - Pharmacy Service Process Redesign
Yucheng Chen, Student, University of Connecticut, United States
Manuel Nunez, Associate Professor, University of Connecticut, United States
Stephanie Gernant, Assistant Professor, University of Connecticut, United States
Charles Upton, Assistant Professor, University of Connecticut, United States

We use queuing models to assess economies of scale, redesign workflows, and improve capacity management at pharmacies offering Medication Therapy Management (MTM) services. MTM is a process aimed at optimizing drug therapy and improving therapeutic outcomes of medication-controlled conditions in patients through direct counselling and follow up with pharmacists.

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Saturday, 09:45 AM - 11:15 AM, Columbia 4
Track: Healthcare Analytics

Invited Session: Emergency Care and Information Use in Healthcare
Chair(s): Marco Bijvank

093-0141 Design of Specialist Response Policies in Emergency Departments: A Data-Driven Approach
Cheng Zhu, Post Doc/Researcher, Nanjing University, Canada
Beste Kucukyazici, Assistant Professor, Mqgill University, Canada
Zhankun Sun, Assistant Professor, City University of Hong Kong, Hong Kong

We aim to reduce the length of stay (LOS) in Emergency Departments (EDs) by designing a systematic response policy for various specialists depending on the demands of their consultation by modeling the specialist consultation (SC) demands via non-homogeneous poisson process of a daily cycle, motivated by real-life individual level data.

093-2051 Physician Staffing and Shift Scheduling at Emergency Departments with Time Varying Productivity
Negar Ganjouhaghighi, Student, University of Calgary, Canada
Marco Bijvank, Assistant Professor, University of Calgary, Canada
Alireza Sabouri, Assistant Professor, University of Calgary, Canada

The number of new patient assessments per hour during the shift of a physician at emergency departments is decreasing. We incorporate the stochastic nature of both patient arrivals and physician productiveness in deciding the number of shifts to schedule as well as the starting and ending time of these shifts.

093-2236 How Does Health IT Impact Malpractice Claims?
Deepti Singh, Student, University of South Florida, United States

Our study examines the impact of Health IT on the practitioners through medical liability claims filed on record in Florida from 2011 to 2016. We examine the impact on the information failures in the clinical processes during different stages of Health IT.
### 093-1528 Evidence of Hot-Hand Bias in Medical Decision-Making

Lawrence Jin, Assistant Professor, National University of Singapore, Singapore

This paper finds evidence of hot-hand bias in physicians’ decision-making during childbirth. I utilize 1.3 million hospital admissions for childbirth in New York State over 2010-2015, and find that physicians are 2% more likely to perform a C-section after having previously performed a successful C-section. Welfare implications are discussed.

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### 211 Saturday, 09:45 AM - 11:15 AM, Columbia 5

#### Invited Session: Human-Centric Healthcare Operations

**Chair(s):** David Rea, Craig Froehle

#### 093-1419 Assessing Cost-Effectiveness of Behavioral Health Interventions with Incomplete Participation

Murray Coté, Associate Professor, Texas A&M University, United States
Tiffany Radcliff, Professor, Texas A&M University, United States
Melanie Whittington, Assistant Professor, University of Colorado Denver, United States
Michael Daniels, Professor, University of Florida, United States

Is an effective weight reduction intervention that involves both education and behavioral coaching also cost-effective in reducing Type 2 Diabetes? Our cost-effectiveness analysis examined participant transitions across HbA1C levels over time. Markov chains, Monte Carlo simulation, and imputed data methods identified lower expected costs and higher Quality Adjusted Life Years.

---

#### 093-0304 Toward an Effective Design of Preventive Health Care Delivery: Collaboration With Primary Care Providers

Yingchao Lan, Assistant Professor, University of Nebraska Lincoln, United States
Aravind Chandrasekaran, Associate Professor, Ohio State University, United States

While both practitioners and researchers have recognized the importance to design an effective preventive care delivery system to improve population health and health delivery efficiency, it’s still unclear how. This paper addresses this gap by studying how collaboration with primary care providers can improve population health and efficiency.

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#### 093-0432 Risk-Averse Appointment Scheduling

Ken Klassen, Professor, Brock University, Canada
Amir Ahmadi, Associate Professor, Amirkabir University of Technology, Iran (Islamic Republic of)
Zahra Jalali, Student, McGill University, Canada

Most prior work in outpatient appointment scheduling has assumed the decision maker is risk-neutral. This research considers the perspective of a risk-averse decision maker. We show how prior reported findings for optimal appointment-scheduling policies can be adjusted if the scheduler wants to avoid risk.

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#### 093-0754 Ensuring Fairness in Physician Time Allocation: A Multi-Objective Optimization Approach

David Rea, Student, University of Cincinnati, United States
Craig Froehle, Professor, University of Cincinnati, United States
Brian Stettler, Associate Professor, University of Cincinnati, United States
Suzanne Masterson, Professor, University of Cincinnati, United States
Arthur Pancioli, Professor, University of Cincinnati, United States

Fairness in resource allocation problems remains poorly defined despite its widespread importance. Viewing fairness as a form of organizational justice, we demonstrate how to allocate physician clinical time while balancing two competing aspects of fairness - equity and equality - using primary data and multi-objective optimization.

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### 212 Saturday, 09:45 AM - 11:15 AM, Columbia 6

#### Invited Session: Staffing in Healthcare Operations

**Chair(s):** Feng (Susan) Lu

#### 093-0331 Turnover Among Part-Time Nursing Aides: Scheduling Smarter

Kevin Mayo, Student, Indiana University, United States
Eric Webb, Assistant Professor, University of Cincinnati, United States
Kurt Brethauer, Professor, Indiana University, United States
George Ball, Assistant Professor, Indiana University Bloomington, United States

Extremely high turnover rates among part-time nurse aides can have significant negative effects on patient outcomes. We examine 6,634 part-time nurse aides and 5,305 turnovers to determine how scheduling affects turnover. We identify the turnover impacts of the amount, variation, and type of scheduling, providing managerial insights to reduce turnover.

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#### 093-0491 Staffing for Better Outcomes: Insights from Blood Donation

Wilson Lin, Student, University of Southern California, United States
Tianshu Sun, Assistant Professor, University of Southern California, United States
Feng (Susan) Lu, Associate Professor, Purdue University, United States
Ginger Jin, Professor, University of Maryland, United States

How can organizations leverage staffing to achieve better outcomes? Using micro-level data from a major Chinese blood bank, we estimate nurse-donor matching’s effect on a donor’s donation volume and return likelihood. We identify a trade-off between short and long term outcomes and find improved matching can provide economically significant benefits.

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#### 093-0574 Impact of Supplemental and Float Staffing Policies on Perceived Quality of Care


In this paper, we study the effect of supplemental and float staffing on perceived quality of care at the unit-level in hospitals and hypothesize a moderating effect of workload and severity of patient illness in the unit on this relationship.

There is a recent push to use more non-physician providers to save costs in primary care delivery. In this paper, we develop an analytical model to study the impact of such non-physician providers on key system outcomes including physician compensation and patient health.

We examine the effect of firm-specific business disruptions (both managerial and operational) on the performance of small firms in emerging markets and the effectiveness of appropriate resilience strategies in buffering against these disruptions, using a hand-built panel data set on 646 small firms over four time periods in Kampala, Uganda.

Detecting trends can help retailers determine effective personalized promotion plans. We introduce a personalized demand model that captures customer-trends from transaction data. Moreover, we develop a provably-good greedy approach for the promotion targeting problem. Using data from a large fashion retailer, we test our customer-trend model and the targeting algorithm.

A Guaranteed Support Price (GSP) for a crop is a guaranteed per-unit price, announced before the growing season, at which a governmental entity promises to procure the crop from farmers. We derive analytically supported insights on the welfare implications of a GSP scheme and examine related questions.

We estimate consumer preferences for the attributes of ride-hailing services using discrete choice experiments. Among other results, we find that contrary to analyst expectations, consumer use of pooling will drop if the cost of driving falls with the introduction of autonomous vehicles because the financial incentive to pool is reduced.

Motivated by the bike-sharing system, two competition supply chains in which the manufacturer sells products to the internet platform operator and then leases products to customers are considered. Differential equations are established to describe the demands. The optimal wholesale price, lease price, and service level are investigated and shown by simulations.

Free-Ride Policies in Free-Floating, Electric Vehicle Share Systems
Fernanda Bravo, Assistant Professor, UCLA Anderson School of Management, United States
Bobby Nyotta, Student, University of California Los Angeles, United States
Jacob Feldman, Assistant Professor, Washington University St Louis, United States
We study the effectiveness of offering free rides to charging stations in a dockless, electric vehicle share system. These rides keep vehicles charged and rebalance the system, but do not generate revenue. We find simple offer policies are nearly optimal and validate the performance in simulations using real operations data.

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<th>Session</th>
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<th>Authors</th>
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<tbody>
<tr>
<td>093-2124</td>
<td>Capacity Constrained Two Sided Markets</td>
<td>Kaitlin Daniels, Assistant Professor, Washington University St Louis, United States</td>
<td>Kaitlin Daniels, Assistant Professor, Washington University St Louis, United States</td>
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<tr>
<td>093-2301</td>
<td>The Role of Trust in Aligning Capacity Decisions in Supply Chains</td>
<td>Sara Benetti, Student, INCAE, Costa Rica, Florian Federspiel, Assistant Professor, INCAE, Costa Rica, Kyle Hyndman, Associate Professor, University of Texas Dallas, United States, Santiago Kraiselbud, Associate Professor, INCAE, Costa Rica, José Lopez Quirós, Student, INCAE, Costa Rica</td>
<td>Sara Benetti, Student, INCAE, Costa Rica, Florian Federspiel, Assistant Professor, INCAE, Costa Rica, Kyle Hyndman, Associate Professor, University of Texas Dallas, United States, Santiago Kraiselbud, Associate Professor, INCAE, Costa Rica, José Lopez Quirós, Student, INCAE, Costa Rica</td>
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<tr>
<td>093-208</td>
<td>Network Trust and Executive Behavior in Supply Chain Interactions</td>
<td>Emily Choi, Assistant Professor, University of Texas Dallas, United States, Ozalp Ozer, Professor, University of Texas Dallas, United States, Yanchong Zheng, Associate Professor, Massachusetts Institute of Technology, United States</td>
<td>Emily Choi, Assistant Professor, University of Texas Dallas, United States, Ozalp Ozer, Professor, University of Texas Dallas, United States, Yanchong Zheng, Associate Professor, Massachusetts Institute of Technology, United States</td>
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<td>093-2272</td>
<td>Risk Taking Behavior and Optimism Bias in Social Feedback Contexts</td>
<td>Musen Li, Student, Tsinghua University, China, Jiayi Yu, Post Doc/Researcher, Tsinghua University Department of IE, China</td>
<td>Musen Li, Student, Tsinghua University, China, Jiayi Yu, Post Doc/Researcher, Tsinghua University Department of IE, China</td>
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<tr>
<td>093-0448</td>
<td>Designing Reward Structure for Crowdfunding Campaigns</td>
<td>Param Pal Singh Chhabra, Student, Georgia Institute of Technology, United States, Karthik Ramachandran, Associate Professor, Georgia Institute of Technology, United States, Manpreet Hora, Associate Professor, Georgia Institute of Technology, United States, Noa Nissinboim, Student, Israel Institute of Technology, Israel</td>
<td>Param Pal Singh Chhabra, Student, Georgia Institute of Technology, United States, Karthik Ramachandran, Associate Professor, Georgia Institute of Technology, United States, Manpreet Hora, Associate Professor, Georgia Institute of Technology, United States, Noa Nissinboim, Student, Israel Institute of Technology, Israel</td>
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<td>093-1634</td>
<td>On Mimicry: Why Healthcare’s Adoption of Approaches from Tech Limits Innovation</td>
<td>Wiljeana Glover, Assistant Professor, Babson College, United States, Eitan Naveh, Associate Professor, Israel Institute of Technology, Israel, Noa Nissinboim, Student, Israel Institute of Technology, Israel</td>
<td>Wiljeana Glover, Assistant Professor, Babson College, United States, Eitan Naveh, Associate Professor, Israel Institute of Technology, Israel, Noa Nissinboim, Student, Israel Institute of Technology, Israel</td>
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<td>093-1357</td>
<td>Managing Entrepreneurial Risk: An Operations Management Framework</td>
<td>Jennifer Bailey, Assistant Professor, Babson College, United States</td>
<td>Jennifer Bailey, Assistant Professor, Babson College, United States</td>
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<td>093-0428</td>
<td>Delegated Search’s Impact on Startup Supply Chain Contracting and Order Allocations</td>
<td>Berke Guzelsu, Student, Boston University, United States, Nitin Joglekar, Associate Professor, Questrom School of Business, United States</td>
<td>Berke Guzelsu, Student, Boston University, United States, Nitin Joglekar, Associate Professor, Questrom School of Business, United States</td>
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We examine the effects of a delegated search on startup supply chain contracting when a large supplier presents a poaching threat. Using a game theory framework, we evaluate the order allocation decision an entrepreneurial firm can make to influence the collaborative supplier’s level of experimentation that influences market size.

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<tr>
<td>093-0303</td>
<td>Identifying Drivers of Commercial Value of Healthcare Innovations</td>
<td>Sinan Erzurumlu, Associate Professor, Babson College, United States</td>
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<td>Dessi Pachamanova, Professor, Babson College, United States</td>
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We develop a framework for identifying factors that contribute to the commercial value of innovations. We illustrate the approach on data from a large healthcare provider and discuss strategic implications of the findings.

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<tr>
<td>093-2400</td>
<td>Tutorial: Asymptotic Analysis of Constant-Order Policies in Inventory Models with Lead Times</td>
<td>Linwei Xin, Assistant Professor, University of Chicago, United States</td>
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In this tutorial, we will provide an overview of recent research on asymptotic analysis of constant-order policies in inventory models with lead times. We will also discuss new research directions as well as open questions.

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<td>093-0921</td>
<td>Managing Workplace Flexibility</td>
<td>Vasiliki Kostami, Associate Professor, HEC Paris, France</td>
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In most workplaces, employees are expected to excel in different skills and are heterogeneous in their task preferences. We study two innovative arrangements in the workplace related to flexibility in task assignment so as to improve everyone's welfare.

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<td>093-1155</td>
<td>Revenue Management for Parking with Advanced Reservations</td>
<td>Qingchen Wang, Student, University of Amsterdam, Netherlands</td>
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<td>Ruben van de Geer, Student, Vrije Universiteit Amsterdam, Netherlands</td>
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<td>Arnoud Den Boer, Assistant Professor, University of Amsterdam, Netherlands</td>
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We develop a data-driven solution to optimize the pricing and blocking policy of advance reservations for a smart parking technology company. This problem differs from a standard revenue management problem due to unknown and variable times of arrival and lengths-of-stay, so formulating a dynamic programming model would thus be infeasible.

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<tr>
<td>093-1164</td>
<td>Shape Demand Peaks and Valleys in Service Industries Using Online Deals</td>
<td>Simin Li, Student, Northwestern University, United States</td>
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<td>Kejia Hu, Assistant Professor, Vanderbilt University, United States</td>
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<td>Martin Lariviere, Professor, Northwestern University, United States</td>
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We empirically study how service providers design online deals advance sales period (T) and discount tailoring to operating margin and market demand change to smooth holiday demand swings. We find an average profit increase of 78% if T is strategically designed.

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<td>093-0307</td>
<td>Humanitarian Service Operations: Reframing the Flood Disaster Recovery Processes</td>
<td>Niratcha Tungtisanont, Assistant Professor, University of Maryland, United States</td>
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<td>Aleda Roth, Professor, Clemson University, United States</td>
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We draw upon the service strategy literature, we consider the roles of various stakeholders—individuals, communities, and governments—in the co-production disaster relief services and activities. This service operations strategy framework provides an overarching road map that informs research and practice for improving the effectiveness of a flood disaster recovery.

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<td>093-1269</td>
<td>Text Analytics in Humanitarian Logistics Research: Challenges and Opportunities</td>
<td>Nathan Kunz, Assistant Professor, University of North Florida, United States</td>
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</table>

Access to data is a challenge in humanitarian logistics research. However, humanitarian organizations publish large amounts of text that researchers can use (reports, news, social media, etc.). This study presents an automated content analysis method to extract valuable data from large volumes of text. It discusses some challenges of this technique.
Managing Commodity Stock-Outs in Public Health Supply Chains in Developing Countries: An Empirical Analysis

Amir Karimi, Student, University of Minnesota, United States
Karthik V. Natarajan, Assistant Professor, University of Minnesota, United States
Kingshuk Sinha, Professor, University of Minnesota, United States

Public health supply chains in developing countries are faced with frequent incidents of health commodity stock-outs in the last-mile. Using data from the field, we investigate the drivers of stock-outs and uncover mitigation mechanisms that health facilities in the last-mile can leverage to minimize the risk of stock-outs.

Improving Hunger Relief Food Donation Programs: A Socially Responsible Supply Chain Innovation

Kenneth Boyer, Professor, Ohio State University, United States
John Lowrey, Student, Ohio State University, United States

Many large grocery Retail Chains share ambitious goals related to social impact and the community. Walmart, for example, has committed to donate 4 billion meals to fight hunger by 2020. However, many food donation programs are operated ad-hoc. We explore how to optimize food donations.

What Drives Humanitarian Organizations' Donation Income: An Empirical Investigation

Iman Parsa, Student, Arizona State University, United States
Mahyar Eftekhar, Assistant Professor, Arizona State University Tempe, United States
Charles Corbett, Professor, UCLA Anderson School of Management, United States

Humanitarian organizations rely heavily on donations. We empirically study the impact of a wide range of factors on individual donations and government grants that humanitarian organizations receive to identify mechanisms by which they can increase their donation income. These factors include program spending ratio, fundraising investment, transparency, and media exposure.

Sustainability Certification Announcements and Stock Market Reaction: The role of Legitimacy

Yuting Feng, Student, Shanghai Jiao Tong University, China
Qinghua Zhu, Professor, Shanghai Jiaotong University, China

The relationship between sustainability certification and financial performance is studied, but fails to draw a consistent result and is rarely considered from the legitimacy view. We clarified the disputes by showing that the financial performance of sustainability certifications are contingent on the firms' legitimacy by the government and their sociopolitical legitimacy.

An Empirical Study of Risk Signals with Actions and Outcomes in P2P Lending Markets

Hoda Atef Yekta, Assistant Professor, Youngstown State University, United States

This study seeks to shed light on the interplay between the players in Peer-to-Peer lending markets, showing how signals from one class of participants affects the behavior of others using data analytics tools on a large dataset of publicly available loan information for over four years of loan origination requests.

Exploration of the Value Delivery Process in Social Entrepreneurship: An Empirical Study

Anil Kumar, Student, Tata Institute of Social Sciences, India
Satyajit Majumdar, Professor, Tata Institute of Social Sciences, India
Ajit Kumar, Student, National Institute of Industrial Engineering, Mumbai, India
Gautam Prakash, Assistant Consultant, TCS, India

Value delivery is the strategy execution process to achieve the organizational mission. After conducting case studies of three social enterprises in the agri-tech sector, we have found that technology, market disruption and integration, community-friendly value proposition, innovative processes, and integrated entrepreneurial opportunity exploration are keys to the value delivery.

Implications of OM-Related Imitation on Financial Performance of Manufacturing Firms

cherry singhal, Assistant Professor, University of New Mexico, United States
Alan Mackelprang, Associate Professor, Georgia Southern University, United States
Manoj Malhotra, Professor, Case Western Reserve University, United States

Innovation and imitation are both established strategies for augmenting firm profitability. Expropriation of the innovating firm's innovation benefits the imitating firm, but financially hurts the innovating firm. Using RBV, the study investigates the factors that account for the variability in the benefits of imitation and the factors influencing that choice.

"Seemingly-Beneficial" Interventions: Model, Analysis, and Applications to Omnichannel Retail

Harish Guda, Student, University of Texas Dallas, United States
Milind Dawande, Professor, University of Texas Dallas, United States
Ganesh Janakiraman, Professor, University of Texas Dallas, United States

Our work examines a "seemingly-beneficial" intervention: for any fixed actions of the firm and its consumers, the profit of the firm is higher in the presence of the intervention relative to that in its absence. We identify fundamental characteristics that determine whether such an intervention helps or hurts the firm.
Dynamic pricing has become a widely adopted practice in the sports entertainment industry, but practitioners face numerous challenges in its implementation. We develop and estimate a demand model that can be used to evaluate and design dynamic pricing policies for single-game tickets by sports teams.

Forecasting Housing Market Health with Customer Search Patterns
Emily Mower, Student, Harvard University, United States
Recent literature shows that aggregate search measures, like Google Trends, can improve nowcast models significantly. Companies often have much more detailed search measures. In this paper, we demonstrate the value of micro-level search data in nowcasting and forecasting housing market health, using data from a large online real estate platform.

Matching Dynamics in a Peer-to-Peer Freelancer Matching Market
Ashish Kabra, Assistant Professor, University of Maryland, United States
Qingchen Wang, Student, University of Amsterdam, Netherlands
Several two-sided matching platforms exhibit a much larger heterogeneity in their demand and supply users (eg: Airbnb, Taskrabbit) compared to some of the other mainstream platforms (eg: Uber, Ofo). In collaboration with a large scale freelancer matching platform, we study the drivers of the match selection behavior using machine learning.

The Missing Link? The Strategic Role of Procurement in Building Sustainable Supply Networks
Veronica Villena, Assistant Professor, Penn State University University Park, United States
The increasing number of scandals about supplier violations of environmental and social regulations has put companies' reputations at risk. These companies require their suppliers to comply with their sustainability requirements and ask them to "cascade" such requirements to their (lower-tier) suppliers. This research investigates why this cascading effect often fails.

Customer Concentration and Supplier's Corporate Social Performance
xiaoping zhao, Assistant Professor, Shanghai Jiao Tong University, China
Ying Rong, Professor, Shanghai Jiao Tong University, China
jia gao, Student, shanghai jiaotong university, China
Although there are extensive studies about Corporate Social Performance (CSP), our understanding of CSP in supply chain context is limited. In this study, we first identify the correlation between customer concentration and supplier’s CSP. Then we investigate several key factors to help to explain this correlation.

Hazardous Materials (Hazmat) Transport Risk Assessment: A Speed-Based Approach
ZAFER YILMAZ, Assistant Professor, TED University, Turkey
Vedat Verter, Professor, Mcgill University, Canada
The past accident data is used for traditional hazmat transportation risk assessments. In addition to traditional hazmat risk assessment methodologies we developed a speed-based methodology in which different vehicle speeds that affect the risks of involvement in fatal accidents are focused to find more realistic solutions for hazmat transportation.

Implementing Environmental and Social Responsibility (ESR) Programs in Supply Networks Through Multi-Unit Bilateral Negotiation
Qi Feng, Professor, Purdue University, United States
Chengzhang Li, Student, Purdue University, United States
Mengshi Lu, Assistant Professor, Purdue University, United States
George Shankhikumar, Professor, Purdue University, United States
We study ensuring ESR in general supply chain networks through multi-unit bargaining. We derive the equilibrium negotiation outcome and demonstrate its advantages over existing approaches. We also investigate the initiator's preferred implementation structure and various extensions including multiple ESR effort levels, sequential formation of ESR relationships, and multiple ESR programs.
Agricultural Cooperative Pricing of Premium Product

Chair(s): Aditya Jain

093-1212

Demand and Pricing Analytics

Invited Session: Supply Chain Analytics

Saturday, 09:45 AM - 11:15 AM, Intl Ballroom East

Track: Supply Chain Analytics

Chair(s): Aditya Jain

093-1212

Agricultural Cooperative Pricing of Premium Product

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Demand and Pricing Analytics

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093-1212

Agricultural Cooperative Pricing of Premium Product
Saturday, 09:45 AM - 11:15 AM

Nur Cavdaroglu, Assistant Professor, kadir has university, turkey, Turkey
Burak Kazaz, Professor, Syracuse University, United States
Scott Webster, Professor, Arizona State University Tempe, United States

We develop two pricing policies for a cooperative to purchase an agricultural product while stimulating the farmer to make quality improvement investments. Using data from a Turkish olive oil industry, we show that these policies coordinate farmer decisions with the system and lead to 10-15% over the current practice.

093-2386 Car Sales Forecasting Research Based On Online Comment Sentiment Analysis
Jia Zhang, Student, School of Economics and Management, Tongji University, China
Yao Chen, Associate Professor, Shanghai University of International Business and Economics, China

We use natural language processing to analyze relevant online comment data, which was obtained by web crawler technology. Our results of empirical research show that online commentary has a significant impact on the sales impact, in which positive emotions have a greater impact on sales than overall emotions and negative emotions.

093-1518 Demand Forecasting for Shipping Using Tree Models with Big Data Settings
XIAOYU YANG, MACHINE LEARNING ENGINEER, SF Technology Ltd. Co., China
Mingjie Zhang, Machine Learning Engineer, SF Technology Ltd. Co., China
ShiJi Qiao, Algorithm Engineer of Operation Research, SF Technology Ltd. Co., China
DONGYAN XU, DATA SCIENTIST, SF Technology Ltd. Co., China
Xiaolong Yao, Director of The Big Data and Block Chain R&D Center, SF Technology Ltd. Co., China

In this paper, we proposed a strategy to forecast package shipping volume using tree models with big data settings. Various features related to both flow directions and product types have been considered. To test our propositions, we examine the model using real world data and achieve over 91% accuracy.
### Design of Power Purchase Agreements with Renewable Power Producers

**Chair(s):** Yangfang Zhou

Utilities and Fortune 500 companies are increasingly signing power purchase agreements (PPAs) to meet their demand. In this research, we identify the optimal design of PPAs and the renewable capacity addition in equilibrium.

- **093-0260**

### Meeting Corporate Renewable Energy Targets

**Chair(s):** Danial Mohseni Taheri, Student, University of Illinois at Chicago, United States

Several companies have entered power purchase agreements (PPAs) to procure a percentage of future power demand from renewable sources, but research of this practice is lacking. We study procurement portfolios containing PPAs and short-term purchases by tackling two-stage and multi-stage models via analysis and a novel rolling planning approach, respectively.

- **093-1276**

### Electricity Generation with Forward Contract Under Renewable Portfolio Standards

**Chair(s):** Shanshan Guo, Assistant Professor, Shanghai Univ. of Finance and Economics, China

We consider a game between utility firms who sell electricity and trade renewable energy certificate (REC) for profit under the Renewable Portfolio Standard. We derive the optimal capacity and production equilibrium and study how they are affected by the presence of forward contracts for trading REC.

- **093-1686**

### Behind-the-Meter Energy Storage Management in the Commercial Sector

**Chair(s):** Yangfang Zhou, Assistant Professor, Singapore Management University, Singapore

We consider the management of behind-the-meter energy storage in the commercial sector (such as a retail store or a hospital) with distributed renewable energy generation. We model the problem as a Markov decision process and characterize the optimal storage management policy and derive structural properties.

- **093-1557**

### Contagion and Competitive Effects of the Capacity Expansion in China

**Chair(s):** Jingming Pan

Based on the capacity expansion announcements in China and the event study methodology, we studied the contagion and competitive effects in the industry level. The market reaction to capacity expansion announcements is examined. The contagion and competitive effects are also examined.

- **093-0562**

### R&D Incentives Under Vertical and Horizontal Competitive Pressures

**Chair(s):** Wei Yan, Associate Professor, University of Electronic Science and Technology of China, China

We develop a model that accounts for both types of competitive pressure simultaneously. Our results reveal that vertical rivalry reduces manufacturers’ R&D incentives, while horizontal competition stimulates it. We then tested our models using data from the Chinese computer and electronics industry and found strong empirical support for our predictions.

- **093-0833**

### How Does the Power Asymmetry and Relationship Length Impact Social Responsibility of Supply Chain?

**Chair(s):** Zhi Cao, Student, University of Electronic Science and Technology of China, China

We empirically investigated the effects of the power asymmetry and relationship length among supply chain partners on supplier’s socially responsible practices based on the data collecting from manufacturing industry in China, and considered the moderate effects of physical distance, high-tech industry, and state ownership.

- **093-0974**

### A Game-Theoretic Analysis on the Interactions Between Sharing Economy Platforms and Their Incumbents

**Chair(s):** Fei Ye, Student, University of Electronic Science and Technology of China, China

We build a two-period game model to capture the strategic interactions between an incumbent and a sharing economy platform. We identify conditions for the platform to enter and show the impacts of the product’s characteristics and consumers’ sharing utility on the profitability of the platform and the incumbent.

- **093-1209**
Saturday, 11:30 AM - 01:00 PM

231  Contributed Session: Sports Analytics and Performance
Chair(s): Justin Kistler

093-1708  The Multi-League Scheduling Problem with Pairing Constraints
Panagiotis Repoussis, Assistant Professor, Stevens Institute of Technology, United States
Walter Gisler, Head of Optimization Department, GotSoccer LLC, United States

League scheduling problems are notoriously hard to solve. This work focuses on rich multi-league scheduling problems with cross-league pairing constraints and a variety of conflicting requirements (e.g. fairness, police requests, minimize travelling, competitiveness and availability of venues). An Iterated Local Search is proposed that employs a sophisticated ruin-and-recreate perturbation mechanism.

093-2172  Automatic Event Detection in Basketball Using Hidden Markov Models
Min-hwan Oh, Student, Columbia University, United States
Suraj Keshtri, Student, Columbia University, United States
Garud Iyengar, Professor, Columbia University, United States

We propose a framework for automatically labeling play events in basketball games, using the optical player tracking data. We learn the time series of defensive assignments using a player and location dependent attraction model. Then, we learn to detect events such as ball screens, drives and post-ups without any labels.

093-0499  The Impact of Information Availability on Baseball Player Performance
Justin Kistler, Student, University of South Carolina, United States
Stacey Mumbower, Assistant Professor, University of South Carolina, United States
Joel Wooten, Assistant Professor, University of South Carolina, United States

Leveraging advanced tracking software, we conducted a randomized field experiment on a collegiate baseball team. Players in the treatment group received data visualizations on individual performance following each game, while the control group received traditional box score data. Post-experimental analysis compares the performance improvement in each group.

232  Invited Session: Operations Models for Social Good
Chair(s): Kayse Maass

093-1917  Interactive Modeling to Support Criminal Justice-Mental Health Collaboration for People with Serious Mental Illnesses
Kristen Hassmiller Lich, Associate Professor, University of North Carolina Chapel Hill, United States
Sidd Namibiar, Student, North Carolina State University, United States
Elizabeth Sinclair, Director of Research, Treatment Advocacy Center, United States
Tim Coffey, Coordinator, Criminal Mental Health Project, Eleventh Judicial Circuit Court, United States
Isabella Alder, Student, University of North Carolina Chapel Hill, United States

Nationally, the movement to deinstitutionalize care for individuals with serious mental illnesses decreased capacity for hospital-based care without building the requisite community-based services, with consequences for emergency departments, jails, and communities. We present our participatory systems mapping and simulation modeling work with stakeholders to improve cross-system collaboration and decision-making.

093-2013  Placement Optimization in Refugee Resettlement
Andrew Trapp, Associate Professor, Worcester Polytechnic Institute, United States
Alexander Teytelboym, Associate Professor, University of Oxford, Great Britain
Alessandro Martinello, Senior Lecturer, Lund University, Sweden
Tommy Andersson, Professor, Lund University, Sweden
Narges Ahani, Student, Worcester Polytechnic Institute, United States

Thousands of refugees are resettled annually to many countries. Evidence suggests that initial placement profoundly affects lifetime outcomes. We integrate machine learning and integer optimization into an interactive tool that recommends refugee-location placements by optimizing for employment outcomes and allows decision-makers to fine-tune recommendations. Counterfactual employment outcome improvement is 22%-37%.

093-2014  Designing Robust, Efficient, and Fair Gatekeeper Training Interventions for Suicide Prevention
Aida Rahmatulabi, Student, University of Southern California, United States
Phebe Vayanos, Assistant Professor, University of Southern California, United States
Anthony Fulginiti, Assistant Professor, University of Denver, United States
Milind Tambe, Professor, University of Southern California, United States

We consider the problem of selecting “gatekeepers” to train as monitors capable of recognizing warning signs of suicide among their friends. We propose a flexible robust optimization approach capturing uncertainty in gatekeeper performance, incorporating fairness constraints, and scalable to realistic size problems. We showcase performance on real social networks.

093-0501  A Broader Perspective: Integrating Societal Factors into Human Trafficking Shelter Location Models
Kayse Maass, Assistant Professor, Northeastern University, United States
Andrew Trapp, Associate Professor, Worcester Polytechnic Institute, United States
Renata Konrad, Assistant Professor, Worcester Polytechnic Institute, United States

Rehabilitative shelters play a critical role in the safety and long-term recovery of human trafficking survivors. We develop a budget-constrained optimization model that maximizes the societal value of locating additional shelters, discuss methods for quantifying societal factors affecting the placement of shelters, and present computational insights of our study.
Saturday, 11:30 AM - 01:00 PM

Invited Session: 3D Printing/Additive Manufacturing-Enabled Operations

Chair(s): Bin Hu

093-0395  The Impact of 3D Printing on Manufacturer-Retailer Contractual Relationships
Mohammad Arbabian, Student, University of Washington, United States
Michael Wagner, Professor, University of Washington, United States

Recently, 3D printing has been recognized as a new technology in manufacturing. We focus on a wholesale-price contract where, on top of the traditional manufacturing, either the manufacturer or the retailer could adopt this new technology to produce final products. We analyze the equilibrium of the resulting games.

093-1115  Investigating the Impacts of 3D Printing Implementation on Operations and Business Performance: An Empirical Study
Di Li, Lecturer, Birmingham City University, United Kingdom
John Bancroft, Senior Lecturer, Oxford Brookes University, United Kingdom
Mark Elman, Professor, Birmingham City University, United Kingdom
Xinyu Kang, Student, The University of Warwick, United Kingdom
Yucheng Zhang, Student, The University of Warwick, United Kingdom

3D Printing has been widely implemented in manufacturing. However, the extant research lacks investigation of the impacts of this implementation from an empirical perspective. This research aims to reveal how 3D printing implementation affects business performance and further explores how this impact could be moderated by internal and/or external business environments.

093-1977  3D Printing in Spare Parts Logistics
Andrei Sleptchenko, Assistant Professor, Khalifa University, United Arab Emirates

This paper studies the advantages of using Traditional Manufacturing (TM), Additive Manufacturing (AM) or a mix of both for replenishment of spare parts inventories. AM offers short lead times, however, at higher production costs, while TM offers a higher degree of reliability, at the expense of longer lead times.

093-0133  Managing Self-Replicating Innovative Goods
Bin Hu, Associate Professor, Naveen Jindal School of Management, United States
Zhankun Sun, Assistant Professor, City University of Hong Kong, Hong Kong

Inspired by a start-up company that markets 3D printers, we investigate the optimal replication and sales policies in the self-replication business model for innovative goods. We analyze a continuous-time optimal control model to identify two distinct regimes wherein either replication or sale takes priority and fully characterize optimal policies.

Invited Session: Global Supply Chain and Operations Management

Chair(s): Xinyan Cao

093-0944  Small Lending Big: Strategic Pricing Games in Online Supply Chain Finance
Nina Yan, Professor, Central University of Finance and Economics, China
Yang Liu, Student, ????, China
Xun Xu, Assistant Professor, California State University Stanislaus, United States

This study examines pricing strategy for capital-constrained suppliers with dual-channel and online SCF. We compare equilibrium prices and quantities when a supplier competes with e-retailer horizontally or vertically. We find that providing online SCF is a value-added service, and participating in vertical competition can help the e-retailer seize the first-mover advantage.

093-1435  Group Buying with Option of Advance Selling and Presence of Consumers’ Social Impact
Yanni Ping, Assistant Professor, St. Johns University, United States
Wenjing Shen, Associate Professor, Drexel University, United States

This paper integrates group buying with an option of advance selling to explore how these two innovative selling strategies interacted with each other under a dynamic framework. Strategic consumer behavior is considered and incorporated into the design of the retailer’s selling strategy.

093-1452  The Influence of Host National Strategy on Strategic Supply Chain Partner Engagement
Remi Charpin, Assistant Professor, HEC Montreal, Canada
Erin Powell, Assistant Professor, Clemson University, United States
Aleda Roth, Professor, Clemson University, United States

In light of recent global developments, political risk has become a major concern for firms with operations in a host country. We use a qualitative approach to empirically examine when and how China’s national policies towards foreign entities influence western firms’ subsidiaries engagement with their strategic supply chain partner.

093-1927  Optimal Procurement Design for a National Brand Supplier in the Presence of Store Brand
Xinyan Cao, Assistant Professor, Northern Illinois University, United States
Xiang Fang, Associate Professor, University of Wisconsin Milwaukee, United States
Guang Xiao, Student, Hong Kong Polytechnic Univ, Hong Kong
Nan Yang, Professor, University of Miami, United States
We analyze a supply chain that consists of a supplier and a retailer who holds private information of the store brand product. We derive the equilibrium profits and examine the value of information to the supply chain members.
Previous research suggests an overall positive effect of supplier integration on firm performance, but reveals the presence of contingencies. We study the effect of eight theoretically derived contextual and methodological moderators of the relation between supplier integration and firm performance in a comprehensive meta-analytic study.

**Saturday, 11:30 AM - 01:00 PM**

**238**  
Saturday, 11:30 AM - 01:00 PM, Gunston West  
Track: Next Generation Operations  
Contributed Session: **3D Printing and Capacity Management**  
Chair(s): Nathan Kunz

- **093-0705**  
  Prescriptive Analytics for Two-Stage Capacity Planning with Upgrading  
  Pascal Notz, Student, University of Wuerzburg, Germany  
  We present a data-driven prescriptive approach for two-stage capacity planning with upgrading based on empirical risk minimization and kernelization. We characterize the approach by deriving out-of-sample guarantees and evaluate the performance numerically in comparison with several benchmark approaches using the real-world dataset of a logistics service provider.

- **093-1319**  
  The Influence of Additive Manufacturing on Make-to-Order Companies: A Production Planning and Control Perspective  
  Yuan Huang, Lecturer, Cardiff Business School, United Kingdom  
  Daniel Eyers, Lecturer, Cardiff Business School, United Kingdom  
  Mark Stevenson, Professor, Lancaster University, United Kingdom  
  This paper investigates the application of Additive Manufacturing on make-to-order companies offering low-volume high-variety products. A framework on how Additive Manufacturing influences make-to-order manufacturing processes, production planning and control decisions, and competitive advantage is proposed through empirical research that unifies the state-of-the-art in Additive Manufacturing with conventional make-to-order challenges.

**239**  
Saturday, 11:30 AM - 01:00 PM, Fairchild East  
Track: POM in Practice  
Invited Session: **Practice-based inventory and maintenance research**  
Chair(s): Geert-Jan Van Houtum

- **093-0213**  
  Improved Spare Part Inventory Management Using Service Maintenance Information  
  Sarah Van der Auweraer, Student, KU Leuven, Belgium  
  Robert Boute, Associate Professor, KU Leuven, Belgium  
  We improve the inventory management of critical spare parts that are used for service maintenance. We make stocking decisions using information on the maintenance policy, the installed base of the part, and its failure behaviour. The research is motivated by and conducted in close cooperation with an Original Equipment Manufacturer.

- **093-0399**  
  Optimal Processing of Donor Human Milk to Meet Production Targets  
  Lisa Maillart, Professor, University of Pittsburgh, United States  
  We optimize the processing of donor human milk, including the pooling of milk across donors, batching pooled milk, and assigning batches to pasteurizers. Numerical results demonstrate a significant improvement in pooling outcomes and production utility compared to former practice at Mothers’ Milk Bank of North Texas.

- **093-2097**  
  Development of a Smartphone App to Improve the Management of Realibility Centered Maintenance  
  Rafaela Aguilar, Student, Federal University of Juiz-de-Fora, Brazil  
  Luiz Alves, Professor, Universidade Federal De Juiz De Fora, Brazil  
  Victor Aguilar, Student, Federal University of Juiz-de-Fora, Brazil  
  This paper presents the development and application of a Smartphone App for improving performance of maintenance management focused on RCM. The results of its use after application in two Brazilian companies demonstrated excellent improvement in maintenance performance.

- **093-0184**  
  Printing Spare Parts at Remote Locations: Fulfilling the Promise of Additive Manufacturing  
  Geert-Jan Van Houtum, Professor, Eindhoven University of Technology, Netherlands  
  Bram Westerweel, Student, Eindhoven University of Technology, Netherlands  
  Rob Basten, Associate Professor, Eindhoven University of Technology, Netherlands  
  We show that 3D printing of spare parts can be beneficial at missions of the Royal Netherlands Army. These parts can temporarily replace critical components in technical systems to bridge the time between the next replenishment. The problem is modeled as a dual sourcing inventory problem.

**240**  
Saturday, 11:30 AM - 01:00 PM, Fairchild West  
Track: Economics Models in Operations Management  
Invited Session: **Emerging Topics in OM-Economics Interface**  
Chair(s): Somya Singhvi Yanchong Zheng

- **093-0382**  
  Operational Transparency for Digital Employees  
  Somya Singhvi Yanchong Zheng
Operational transparency has been shown to improve consumer-facing outcomes. We explore whether providing operational transparency to online employees impacts work quality. We find that disruptions to an online job system result in significantly worse job performance, but that providing operational transparency can remove the negative impacts.

093-0565 Online-to-Offline Platform Models
Xu Joseph (Jiaqi), Assistant Professor, Carnegie Mellon University, United States
Hui Li, Assistant Professor, Tepper School of Business, Carnegie Mellon University, United States
Sridhar Tayur, Professor, Carnegie Mellon University, United States

We study commonly observed business models for online-to-offline (O2O) platforms. We derive optimal strategies and equilibrium outcomes to understand: how the models function, how best to avoid incentive misalignment and system loss, which model is better for the platform, the merchant, the system, and under what market conditions.

093-1282 Disruptions, Resilience and Performance of Emerging Market Entrepreneurs: Evidence from Uganda
Amrita Kundu, Student, London Business School, United Kingdom
Kamalini Ramdas, Professor, London Business School, United Kingdom
Stephen Anderson-Macdonald, Assistant Professor, Stanford University, United States

We examine the effect of firm-specific business disruptions (both managerial and operational) on the performance of small firms in emerging markets and the effectiveness of appropriate resilience strategies in buffering against these disruptions, using a hand-built panel dataset on 646 small firms over four time periods in Kampala, Uganda.

093-1096 Can Online Auctions Increase Farmers' Revenue? Evidence from Agricultural Markets in India
Retsef Levi, Professor, MIT, United States
Somay Singhvi, Student, Massachusetts Institute of Technology, United States
Yanchong Zheng, Associate Professor, Massachusetts Institute of Technology, United States

The government of Karnataka in India started integrating all its regulated markets through an online platform in 2014. In this work, we examine the impact of this platform on wholesale prices of commodities using a quasi-experimental approach. Our results suggest that investing in transparency can substantially improve farmer revenue.

241 Saturday, 11:30 AM - 01:00 PM
Invited Session: Retail Supply Chain
Chair(s): Ruomeng Cui Meng Li
Track: Retail Operations

093-0232 The Benefits of Un-Pooling Logistics Resources: An Empirical Study
Yifan Feng, Student, University of Chicago, United States
Rene Caldentey, Professor, University of Chicago, United States
Linwei Xin, Assistant Professor, University of Chicago, United States

We study the effect of logistics resources on service performance. We show empirically that operating dedicated resources can reduce orders' delivery times, an effect that is more significant during peak days. Thus the operational principle of resource pooling is not necessarily beneficial in the context of a logistics system.

093-2132 Online Inventory Disclosure: The Impact of How Consumers Perceive Information
Tolga Aydil, Associate Professor, Baruch College, United States
Michael Pangburn, Associate Professor, University of Oregon, United States
Elliot Rabinovich, Professor, Arizona State University Tempe, United States

Given varied consumer perceptions of inventory information, online retailers' presentation of such information influences purchase behavior. We investigate optimal inventory disclosure policies assuming two distinct consumer segments: savvy consumers who can predict a retailer's stock levels (even when masked) and naive consumers who rely on apriori (stochastic) beliefs regarding inventory.

093-1657 The Impact of Urban and Rural Customer Preferences for Logistics Services on E-Grocery Logistics Operations
Martin Waltz, Post Doc/Researcher, WU Vienna University of Economics and Business, Austria
Andreas Mild, Associate Professor, WU Vienna University of Economics and Business, Austria
Christian Fikar, Post Doc/Researcher, WU Vienna University of Economics and Business, Austria

Preferences for different e-grocery logistics services (e.g. delivery fee, delivery day) of Austrian customers have been derived by conducting two surveys, including conjoint studies. Based on these results, an agent-based simulation optimization decision support system has been developed to show the implications of a grocer's logistics operations.

093-0873 Wholesale Price Discrimination in Global Sourcing: Field Evidence from Alibaba
Ruomeng Cui, Assistant Professor, Emory University, United States
Jingyun (Jenny) Li, Assistant Professor, California State University Stanislaus, United States
Meng Li, Assistant Professor, Rutgers University, United States
Lili Yu, Student, University of Science and Technology of China, China

There is limited study on suppliers' price-quoting behaviors and price discrimination in business-to-business (B2B) markets. In this research, we investigate whether wholesale price discrimination exists by conducting randomized field experiments on Alibaba.com, the world's largest online global-trade platform.
MRO Configuration Management for Complex Long-life Products - A Case Study

Chunliu Zhou, Student, Dalian University of Technology, United States
Xiaobing Liu, Professor, Dalian University of Technology, China
Lian Qi, Associate Professor, Rutgers University, United States
Hongguang Bo, Associate Professor, Dalian University of Technology, China

Services like maintenance, repair, and overhaul (MRO) for complex products are increasingly considered in traditional manufacturing enterprises to enhance their competitiveness. To reduce negative effects of current issues like data inconsistency, a service management system and an example are explored to illustrate the application of blockchain technologies in service-oriented manufacturing.
Saturday, 11:30 AM - 01:00 PM

MRO activities make product data under continuous changes. How to maintain data continuity and consistency is important for efficient MRO activities. This paper explores the application possibility of configuration management (CM) in MRO process and builds a MRO CM framework with a case study of high-speed trains.

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<th>Session</th>
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| 245 | Saturday, 11:30 AM - 01:00 PM, Columbia 1 | Dispatching and Scheduling in Production and Service Systems | Computational Strategies for Stochastic Programming for Integrated Scheduling and Procurement Problems Involving Endogenous Uncertain Parameters  
Yue Sha, Student, Tsinghua University, China  
Hui Cao, Associate Professor, Tsinghua University, China  
We study a combined optimization problem of job scheduling and material replenishment in the customized manufacturing process. To develop real-time schedules, we propose a multistage stochastic programming model involving endogenous uncertain parameters. A set of theoretical reduction properties and an approximate solution approach are proposed to tackle the curse of dimensionality. |
| 246 | Saturday, 11:30 AM - 01:00 PM, Columbia 2 | Operational Excellence | Simulation Modeling of Real-Time Scheduling of Building Elevator Systems  
Godwin T, Professor, IIM Tiruchirappalli, India  
Real-time scheduling alternatives for single and multiple building elevator systems are evaluated for minimizing a person’s waiting time for an elevator and the time spent in the elevator. The arrivals follow time-varying statistical distribution. A simulation modeling approach is used to evaluate the elevator scheduling alternatives. |
| 247 | Saturday, 11:30 AM - 01:00 PM, Columbia 3 | Service Operations | Optimal Retail Return Policies with Wardrobing  
Guangzhi Shang, Assistant Professor, Florida State University, United States  
Bikram Ghosh, Associate Professor, University of Arizona, United States  
Michael Galbreth, Professor, University of Tennessee Knoxville, United States  
Published in Production and Operations Management, Vol. 26, No. 7, July 2017, pp. 1315-1332  
Surprise, Anticipation, and Sequence Effects in the Design of Experiential Services  
Mike Dixon, Assistant Professor, Utah State Univ, United States  
Liana Victorino, Associate Professor, University of Victoria, Canada  
Robert Kwortnik, Associate Professor, Cornell University, United States  
Rohit Verma, Professor, Cornell University, United States  
Published in Production and Operations Management, Vol. 26, No. 5, May 2017, pp. 945-960  
Benefits of Surgical Smoothing and Spare Capacity: An Econometric Analysis of Patient Flow  
Diwas Kc, Associate Professor, Emory University, United States  
Christian Terwiesch, Professor, The Wharton School, United States |
093-2462  The Boarding Patient: Effects of ICU and Hospital Occupancy Surges on Patient Flow
Elisa Long, Associate Professor, UCLA Anderson School of Management, United States
Kusum Mathews, Student, Yale University, United States

Published in Production and Operations Management, Vol. 27, No. 12, December 2018, pp. 2122-2143

248  Saturday, 11:30 AM - 01:00 PM, Columbia 4  Track: Healthcare Analytics
Invited Session: Machine learning and optimization in healthcare
Chair(s): Velibor Misic

093-0933  Predicting treatment toxicity and efficacy in multiple myeloma from entities extracted from Amazon Comprehend Medical
David Coffey, Physician, Fred Hutch Cancer Research Center, United States
Emisa Nategh, Student, University of Washington, United States
Michael Wagner, Professor, Foster School of Business, United States
Yong-Pin Zhou, Professor, University of Washington, United States

The aim of our research is to develop an ML model to match patients to the most effective therapy while minimizing toxicities. We used Amazon Comprehend Medical to extract clinical entities in order to train a model that identifies which clinical features are most informative for predicting toxicity and efficacy.

093-2332  Online Scheduling of Outpatients
Kimia Ghobadi, Assistant Professor, Johns Hopkins University, United States
Michael Hu, Student, MIT, United States
Retsef Levi, Professor, MIT, United States
Cecilia zenteno, Operations Research Manager, MGH, United States

In this talk, we demonstrate the use of online (real-time) intra- and inter-day algorithms to schedule outpatients. This scheduling model improves efficiency by allowing the clinics to treat more patients with fewer resources. We show 30% empirical improvement and theoretical worst-case bounds on the performance of the algorithm.

093-1373  Machine Learning Models for Predicting Surgical Readmissions From EHR Data
Velibor Misic, Assistant Professor, University of California Los Angeles, United States
Kumar Rajaram, Professor, UCLA Anderson School of Management, United States

In this talk, we present machine learning models for predicting surgical readmissions using data from a large academic medical center. Our models provide more accurate predictions sooner than existing methods for surgical readmission risk prediction.

249  Saturday, 11:30 AM - 01:00 PM, Columbia 5  Track: Healthcare Operations Management
Invited Session: Improving Coordination in Health Care Delivery
Chair(s): Anita Tucker

093-0878  Antecedents and Consequences of Physician - Patient Communication
David Dobrzykowski, Associate Professor, Bowling Green State University, United States
Monideepa Tarafdar, Professor, Lancaster University, United Kingdom
David Ding, Assistant Professor, Rutgers Business School, United States

We examine Physician-Patient Communication (MDcom), testing two models - one incorporating survey data measuring managers’ perceptions about the effects of their hospital’s HIT orientation on MDcom and another using secondary data revealing the longitudinal effects of MDcom. Our results reveal how managers can drive MDcom and positive financial performance.

093-1364  Nursing Team Continuity and its Influence on Medical Outcomes: Evidence from a Multicenter Study
Kerstin Ellermann, Student, University of Cologne, Germany
Ludwig Kunzt, Professor, University of Cologne, Germany
Stefan Scholtes, Professor, Cambridge University, United Kingdom

Low staffing levels are known to be a risk factor for medical outcomes. It is, however, important to not only consider nurse-staffing levels, but also structures of staff schedules. Based on data from a multicenter study with 66 NICUs, we analyze the association between nursing team continuity and patient outcomes.

093-1511  The Impact of Primary Care Provider Availability on Patient Care
Hessam Bavafa, Assistant Professor, University of Wisconsin-Madison, United States
Christian Terwiesch, Professor, The Wharton School, United States

Emergency room overcrowding and overuse are significant problems in the United States. A possible reason is that primary care providers are too busy to provide timely appointments. We use a large dataset from the Veterans Health Administration to shed light on this claim.

093-1730  Surge Capacity Deployment in Hospitals: Effectiveness of Response and Mitigation Strategies
Alex Mills, Associate Professor, Baruch College, United States
Jonathan Helm, Assistant Professor, Kelley School of Business, United States
Yu Wang, Student, Indiana University, United States
Recent government regulations in the US require hospitals to take adequate measures to manage surge capacity, the ability to accommodate a sudden increase in demand. We examine response and mitigation strategies that affect surge capacity and show how to determine when they are complements or substitutes.

Saturday, 11:30 AM - 01:00 PM

Invited Session: Emerging Topics in Healthcare Operations

Chair(s): Zahra Azadi

093-0042 Stability Analysis of Supply-Demand Models with Multiple Random Delays
Sara Nourazari, Assistant Professor, California State University Long Beach, United States
Time delays are an inevitable aspect of many supply-demand systems. This study exploits deterministic stability maps to facilitate optimal control design of systems with multiple nondeterministic time-delays. This approach is especially beneficial in healthcare supply-demand management when capacity adjustment delays are not avoidable and generally are stochastic.

093-1011 Improving the Inventory of Surgical Instruments via Data Driven Simulation and Optimization Models
Amogh Bhosekar, Student, Clemson University, United States
Tugce Isik, Assistant Professor, Clemson University, United States
Sandra Eksioglu, Associate Professor, Clemson University, United States
This study presents a Just-In-Time modeling framework that leads to improved inventory of surgical instruments in a healthcare facility. Historical data points to low utilization of surgical instruments. We propose data-driven simulation and optimization models to integrate surgery schedules with instrument inventories. Numerical analyses indicate improvements of inventory utilization.

093-2283 A Social Network Analysis Application for Enhancing Outpatient Clinical Service - An Indian Healthcare Scenario
Venkataramanaih Saddikut, Associate Professor, Indian Institute of Technology Lucknow, India
Pesaru Vigneshwar Reddy, Software Engineer, Cypress Semiconductors Corp, India
Mukund Janardhan, Assistant Professor, Leicester University, United Kingdom
This paper focuses on interdisciplinary dependencies and socio-technical aspects that make up the relationships between the doctors, staff, and nurses which, eventually enhances their performance and improves the patient satisfaction in an outpatient setting. This study is based on a questionnaire administered to randomly selected public hospital staff, doctors, nurses, and administrators.

093-0042 Stochastic Optimization Models for Childhood Vaccine Distribution Network: A Case Study in Niger
Zahra Azadi, Assistant Professor, University of Miami Business School, United States
Sandra Eksioglu, Associate Professor, Clemson University, United States
The main objective of this research is to increase vaccine coverage in low income countries by improving performance of the corresponding supply chain. We propose a chance constraint programming model to identify optimal supply chain designs and management strategies. We apply this model to a case study in Niger.

250 Saturday, 11:30 AM - 01:00 PM, Columbia 6
Track: Healthcare Operations Management

Invited Session: SCM Best Student Paper Competition 2

Chair(s): Georgia Perakis

093-2468 The Distribution-free Inventory Problem for E-commerce Fulfillment Networks
Arvind Govindarajan, Student, University of Michigan Ann Arbor, United States
Amitabh Sinha, Principal Scientist, Amazon.com, United States
Joline Uichanco, Assistant Professor, University of Michigan, United States
We consider a distributionally robust model for e-commerce network inventory optimization with reactive recourse, given only the mean and covariance of the demands. We show the problem to be tractable under a special class of fulfillment costs which produces a hierarchy to spillover fulfillment.

093-2469 Learning Personalized Product Recommendations with Customer Disengagement
Hamsa Bastani, Assistant Professor, University of Pennsylvania, United States
Pavithra Harsha, Research Staff Member, IBM, United States
Georgia Perakis, Professor, Massachusetts Institute of Technology, United States
Divya Singhvi, Student, Massachusetts Institute of Technology, United States
We consider the problem of sequential product recommendations when customer preferences are unknown and customers are likely to disengage from the platform. We prove that bandit learning algorithms over-explore and the greedy policy under-explores in this regime. Finally, we propose a new learning algorithm with strong analytical and empirical performance.

093-2470 Joint Pricing and Production : A Fusion of Machine Learning and Robust Optimization
Qinshen Tang, Student, National University of Singapore, Singapore
Georgia Perakis, Professor, Massachusetts Institute of Technology, United States
Melvyn Sim, Professor, National University of Singapore, Singapore
Peng Xiong, Lecturer, National University of Singapore, Singapore
We integrate K-means clustering with robust optimization to address a two-period joint pricing and production problem. We construct a K-means ambiguity set and propose an affine recourse approximation to reformulate it as an MILP. Our framework can increase expected profits by 1.11% on average when applied to most out-of-sample tests.
This paper develops an analytical framework to show that, counterintuitively, the primary retail platform’s control of the resale market may lead to an all-win outcome, benefiting the platform, the upstream provider, and the consumers. Using data from Ticketmaster.com and StubHub.com, we provide some suggestive empirical support for our theoretical predictions.

The paper studies the effect of product substitutability on the optimal profits in a common retailer channel. Specifically, we analyze whether the retailer and manufacturers prefer more or less substitutability for settings with different demand functions, number of upstream manufacturers, and bargaining powers between manufacturers and the retailer.

This paper investigates how the presence of strategic consumer behavior affects the interactions among a manufacturer, a retailer, and a forward-looking consumer population, within a dual-channel and two-period supply chain model. The problem we consider is motivated by the increasing difficulties in deciding selling/pricing strategies within the New Retail era.

We usually have to make a decision on whether and when to pay a cost to avoid an unexpected loss, such as in the context of machinery maintenance and preventive healthcare. This study addresses this problem in which individuals make such decisions in a degradation process.

We examine the joint effects of pre-scheduled work breaks, short-term fatigue, and long-term fatigue (as measured by psychological burnout) on an employee’s productivity. We test our hypotheses using multilevel models and longitudinal data from servers in a call center. We find key insights based on the cross-level interactions between the three factors.

We study experimentally how social norms evolve in, and affect the performance of, customer-operated service systems, where service times are endogenously determined by the customers. Our data shows that service times are positively serially correlated. We explore several boundary conditions as well as managerial levers to mitigate adverse impacts.
### Saturday, 11:30 AM - 01:00 PM

**254**  
**Chair(s):** Sreekumar Bhaskaran  
**Invited Session:** Managing Uncertainty and Incentives in New Product Development

**254-093-0671**  
An Economic Model of Knowledge Outsourcing  
JaeSeok Lee, Lecturer, The University of Auckland, New Zealand  
Cheryl Gaimon, Professor, Georgia Institute of Technology, United States  
Karthik Ramachandran, Associate Professor, Georgia Institute of Technology, United States  
We introduce a game-theoretic model of knowledge outsourcing. We study how the interaction between a knowledge buyer and supplier is affected by two distinctive aspects of knowledge outsourcing: absorptive capacity and the ability to leverage prior knowledge. We also investigate how uncertainty and information asymmetry influence the equilibrium outcomes.

**254-093-0768**  
Competing Innovation Contests  
Konstantinos Stouros, Assistant Professor, Michael Smurfit Graduate School of Business, Ireland  
Sanjiv Erat, Associate Professor, Rady School of Management, United States  
Kenneth Lichtendahl Jr., Assistant Professor, Darden School of Business, United States  
We study equilibria among mechanisms chosen by firms that design innovation contests.

### Saturday, 11:30 AM - 01:00 PM

**255**  
**Chair(s):** Houcai Shen  
**Invited Session:** Advances in Inventory Theory

**255-093-1009**  
Constant-Order Policies for Lost-Sales Inventory Models with Random Supply Functions: Asymptotics and Heuristic  
JinZhi Bu, Student, The Chinese University of Hong Kong, Hong Kong  
Xiting Gong, Assistant Professor, The Chinese University of Hong Kong, Hong Kong  
Dacheng Yao, Associate Professor, Chinese Academy of Sciences, China  
In this paper, we study constant-order policies (COP) for the lost-sales system with positive lead times and random supply. Besides theoretically analyzing asymptotic properties of the best COP with large lead times and large penalty cost, we also construct a simple and near-optimal heuristic COP and conduct extensive numerical studies.

**255-093-1221**  
Coordinating Inventory and Pricing Strategies Under Total Minimum Commitment Contracts  
Xiting Gong, Assistant Professor, The Chinese University of Hong Kong, Hong Kong  
Quan Yuan, Associate Professor, Zhejiang University, China  
Frank Chen, Professor, City University of Hong Kong, Hong Kong  
We study a total minimum commitment contract embedded in a finite-horizon periodic-review inventory with dynamic pricing system. The buyer commits to purchase a minimum quantity over the entire horizon. It maximizes inventory and pricing decisions at the same time. We analyze the structure of optimal policies and propose heuristic policies.

**255-093-1733**  
Inventory Risk Hedging Strategies in Supply Chains: Contracting and Pricing  
Houcai Shen, Professor, Nanjing University, China  
Weli Xue, Professor, Southeast University, China  
Demand uncertainty causes the risk of supply and demand mismatching. Firms can choose different contracting and pricing strategies to deal with the demand uncertainty. We study the contract and pricing strategy choice of both the supplier and the retailer, considering the whole supply chain.

### Saturday, 11:30 AM - 01:00 PM

**256**  
**Chair(s):** Guangzhi Shang  
**Invited Session:** Data-Driven Insights for Service and Retail Operations

**256-093-0815**  
Inventory Allocation in a Multichannel Setting Involving Drop-Shipping Operations  
Annibal Sodero, Assistant Professor, University of Arkansas - Fayetteville, United States
This study investigates the outcomes of inventory allocation across multiple retail channels by a vendor of fashion products.

093-1288 Can "I" Make "We" Better? An Investigation of Spillover Effects on Grocery Store Check-Out Quality

Hyun Seok (Huck) Lee, Assistant Professor, Oregon State University, United States
Guanyi Lu, Assistant Professor, Florida State University, United States
Junbo Son, Assistant Professor, University of Delaware, United States

Using an operational data set in a grocery store setting, we examine how a cashier’s productivity level affects other cashiers’ performance. We further extend our analysis to the “team” level and explore if the existence of a “super-star” will produce positive effects on overall team performance.

093-1403 An Empirical Study of the Impact of Specialization, Workload, and Product Personalization on Consumer Returns

Hailong Cui, Student, Marshall School of Business, United States
Raj Rajagopalan, Professor, Marshall School of Business, United States
Amy Ward, Professor, Booth School of Business, United States

We study the impact of key operational levers on return rates, while controlling for numerous factors. We find that increased task specialization helps reduce return rates, but the impact is U-shaped. Increased workload levels in production result in higher return rates, whereas product personalization leads to lower return rates.

093-0200 The Impact of Waiting on Customer Responsiveness in Live-Chat Centers

Noyan Ilk, Assistant Professor, Florida State University, United States
Guangzhi Shang, Assistant Professor, Florida State University, United States

We study the impact of waiting times on customer response behavior in the context of online service centers. Using a unique operational data set, we show that waiting before service (i.e., queue wait) accelerates customer engagement, whereas waiting during service (i.e., in-service wait) slows down customer responses.

257 Saturday, 11:30 AM - 01:00 PM, Monroe
Invited Session: Empirical research in humanitarian operations
Chair(s): Maria Besiou Laura Turrini

257 Invited Session: Empirical research in humanitarian operations
Chair(s): Maria Besiou Laura Turrini

093-0487 Resilience to Destructive Leadership: An Empirical Examination of Humanitarian Operations Context

Mojtaba Salem, Student, Kuehne Logistics University, Germany
Maria Besiou, Professor, Kuehne Logistics University, Germany
Niels Van Quaquebeke, Professor, Kuehne Logistics University, Germany

Humanitarians may work under leaders who act aggressively towards them out of the belief that doing so will engender performance. While leadership research suggests this worsens performance, field reports show tough leaders can get the job done. This paper investigates factors that make humanitarian operations context resilient to destructive leadership.

093-0621 Understanding the Concept of Localizing Preparedness Capacity

Lina Nord, Student, Lund University, Sweden
Harwin De Vries, Lecturer, INSEAD, France
Marianne Jahre, Professor, BI Norwegian Business School, Norway
Joakim Kembro, Assistant Professor, Lund University, Sweden
Luk Van Wassenhove, Professor, INSEAD, France

In the humanitarian community, focus is now shifting from global to local operations in preparing for disasters. We present a framework for this localization process of preparedness capacities including a suggested definition of localization and discuss its implications for humanitarian organizations and logistics for the future.

093-1420 Humanitarian Organizational Design and Information Flow

Lauren Bateman, Student, George Washington University, United States
Erica Gralla, Assistant Professor, George Washington University, United States

We examine how humanitarian organizations are designed to enable information flow and how their design varies for different types of responses. Specifically, we compare two different IFRC responses to begin to identify common patterns and differences across disasters.

093-0553 Fleet Sizing Across Different Humanitarian Organizations

Laura Turrini, Assistant Professor, European Business School, Germany
Nathan Kunz, Assistant Professor, University of North Florida, United States
Maria Besiou, Professor, Kuehne Logistics University, Germany
Luk Van Wassenhove, Professor, INSEAD, France

We focus on fleet management and empirically estimate what drives the fleet size of multiple humanitarian organizations in different countries. The analyzed elements include organization size, number of target beneficiaries, and country vulnerability. We derive additional insights by comparing our results across the case organizations.

093-0248 The Impact of Medication Delays on Patient Health in the ICU

Saturday, 11:30 AM - 01:00 PM, Lincoln East
Invited Session: Empirical Research in Healthcare Operations
Chair(s): Maria Ibanez

This study examines the impact of medication delays on patient health in the Intensive Care Unit (ICU).

Results show that delays in administering medications can lead to increased risks for patients, including infections, pressure ulcers, and other complications. The study highlights the importance of prompt medication delivery to maintain patient safety and quality care in the ICU.
Saturday, 11:30 AM - 01:00 PM

**093-0500** Decomposing Volume’s Impact on Performance: Lessons from Kidney Transplants
Philip Saynisch, Student, Harvard University, United States
Robert Huckman, Professor, Harvard University, United States
Nikos Trichakis, Associate Professor, MIT, United States
We study the hospital intensive care unit to investigate the impact of exogenous medication delays, introduced by shift changes, on granular patient health outcomes. We find that the magnitudes of these effects vary by medication type, which allows us to generate a priority list of medications to assist providers.

**093-0507** Physician Peer Effects on Speed and Quality: Evidence from the Emergency Department
Soroush Saghafian, Assistant Professor, Harvard University, United States
Raha Imanirad, Student, Harvard Business School, United States
We estimate peer effects in the context of an Emergency Department (ED) setting by addressing the question of whether peer physicians’ characteristics affect a focal physician's performance. Our findings provide strong evidence for the existence of peer effects in this setting and have important implications for improving the operations of EDs.

**259** Invited Session: Emerging Topics in Empirical Service Operations
Chair(s): Yuqian Xu, Baile Lu

**093-0079** Supply Networks: Does Industry Matter?
Marcus Bellamy, Assistant Professor, Boston University, United States
We demonstrate differences in supply networks of focal firms according to industry. Through an empirical study, we highlight the extent to which the industry context plays in terms of the network structural characteristics and firm performance, where the characteristics of an average representative firm in each industry vary considerably.

**093-0099** An Empirical Analysis of Market Formation, Pricing, and Revenue Sharing in Ride Hailing Services
Liu Ming, Assistant Professor, Chinese University of Hong Kong, China
Tunay Tunca, Professor, University of Maryland, United States
Yi Xu, Associate Professor, University of Maryland, United States
Weiming Zhu, Assistant Professor, I E S E, Spain
Using data obtained from a leading ride-sharing company, we construct and estimate a model of price and demand and supply formation in ride-sharing services based on operational characteristics, such as driver utilization and demand intensity. We further conduct a counterfactual analysis to examine efficiency and welfare implications of pricing and regulation.

**093-1722** Decoding the Behaviors of Gig Economy Workers
Park Sinchaisri, Student, The Wharton School, United States
Gad Allon, Professor, The Wharton School, United States
Maxime Cohen, Assistant Professor, New York University, United States
Gig economy platforms benefit from labor flexibility, but also struggle in planning their workforce. We study on-demand workers’ labor decisions in a ride-hailing context. Using the driver-level data on incentive and decisions and TLC trip record data, we develop an empirical framework to examine behaviors induced by gig platforms' mechanisms.

**260** Contributed Session: Doctoral Consortium 1
Chair(s): Ozge Sahin

**093-2430** Doctoral Consortium 1
Ozge Sahin, Associate Professor, Johns Hopkins University, United States
This session is by invitation only for those doctoral students who have registered. The purpose of the POMS Doctoral Consortium is to help doctoral students maximize their chances of having a successful academic career in our globally competitive environment.

**262** Invited Session: Managing Supply and Market Risks
Chair(s): Rong Li

**093-0065** Mitigating Disruption Risks in Delivery Supply Chains to Serve Contracted Customers
Mert Hakan Hekimoglu, Assistant Professor, Rensselaer Polytechnic Institute, United States
John Park, Assistant Professor, Pepperdine University, United States
Long-term service agreement (LRTSA) is widely adopted in power systems for OEMs and power plants to share equipment maintenance cost. We study LRTSA between an OEM and a power plant with renewable penetrations and characterize the OEM's maintenance schedule, pricing and power plant's dynamic production decision.

We consider the joint capacity and financial hedging strategies for a downside risk-averse global firm that faces multiple demand and foreign exchange rate risks. The firm maximizes the expected profit while controlling its profit risk through a Value-at-Risk (VaR) constraint.

The firm faces a large variation in its disruption exposure over the normal inventory cycle in a concave way. Using real firm's data, we identify how a firm can make use of this concavity feature for risk planning and identify features of the parts that can best achieve this goal.

Bracketing is the practice of ordering multiple sizes of a product and returning all that do not fit. Customers adopt this practice to resolve uncertainty surrounding physical fit. We build a stylized model to show that online retailers can leverage this seemingly negative customer practice to improve profit.

We study a firm selling multiple products to heterogeneous customers. To help customers resolve valuation uncertainty, the firm offers product trials, joint or decoupled, as are common in practice for vineyards. We investigate the trial structure and pricing to understand when joint trials are the optimal form of seller-induced learning.

We consider a retailer with an online channel. Items sold through the channel are stored either at the retailer's central warehouse, with fast delivery, or at its suppliers, with slower delivery. We empirically investigate the impact of inventory location on demand and develop a procedure for how to allocate products.

Logistics is a key component of consumer online shopping experience and is important to the success of online retailing. Using quasi-natural experiments at Alibaba Group, we investigate how improving logistics service influences consumption behavior of consumers, and sales and competition of the online retailers and retailing platforms.
Inclusive Innovation: A Panel Discussion
Karthik Balasubramanian, Assistant Professor, Howard University, United States
Saravanan Kesavan, Associate Professor, University Of North Carolina At Chapel Hill, United States
Bhavani Shanker Uppari, Assistant Professor, Singapore Management University, Singapore
Can Zhang, Assistant Professor, Duke University Durham, United States
Kamalini Ramdas, Professor, London Business School, United Kingdom

Inclusive innovation is the inclusion within some aspect of innovation of groups who are economically excluded. This session presents examples of inclusive innovation in the operations management context in three domains: (i) inclusive product and service innovation, (ii) inclusive process and business model innovation, and (iii) inclusive supply chain innovation.

Self-Guided Approximate Linear Programs
Parshan Pakiman, Student, University of Illinois at Chicago, United States
Selvaprabu Nadarajah, Assistant Professor, University of Illinois at Chicago, United States
Negar Soheili Azad, Assistant Professor, University of Illinois at Chicago, United States
Qihang Lin, Assistant Professor, University of Iowa, United States

Approximate linear programs (ALPs) provide policies and bounds for Markov decision processes (MDPs) arising in challenging operations management applications. Using ALP entails designing parametric MDP value function approximations, which poses a significant implementation hurdle. We develop an ALP scheme that side-steps this issue by leveraging sampling techniques from machine learning.

Customer Acquisition and Retention: A Fluid Approach For Staffing
Eugene Furman, Student, York University, Canada
Adam Diamant, Assistant Professor, York University, Canada
Murat Kristal, Associate Professor, York University, Canada

We model the trade-off between customer acquisition and retention as a multi-class queueing network with returning customers, time-dependent arrivals, and abandonment. Based on its fluid approximation, we propose an approach to determine optimal stationary staffing levels that we test in two real-world applications: advertising campaigns and emergency room operations.

Predictive and Prescriptive Analytics for Location Selection of Add-On Retail Products
Teng Huang, Student, University of Connecticut Storrs, United States
David Bergman, Assistant Professor, University of Connecticut, United States
Ram Gopal, Professor, University of Connecticut, United States

In this paper we study a predictive-and-prescriptive analytics framework for optimizing expansion decisions for retailers selling add-on products. We build predictive models for understanding the derived demand of the add-on product and establish an optimization framework for automating expansion decisions to maximize expected sales.

Collaborations in Joint Replenishment
Simai He, Professor, Shandong University of Finance&Economics, China
Xuan Wang, Assistant Professor, Hong Kong University of Science and Technology, Hong Kong
Jawei Zhang, Associate Professor, New York University, United States

We enhance the study of collaborate in JRP by establishing a simple de-centralized mechanism of high efficiency, with an explanation of a numerical result of almost no lose in social efficiency. Furthermore, we discuss a general framework in which the convexity of a cooperative game is robust with respect to external effects.
Invited Session: Energy management in supply chains and manufacturing
Chair(s): Tianhu Deng
093-0692 Capacity Investment in Renewable Energy Under Subsidy and Supply Uncertainty
Peng zhou, Professor, China University of Petroleum, China
Lumiao Li, Student, Nanjing University of Aeronautics and Astronautics, China
This paper studies a manufacturing firm’s one-time capacity decision of renewable energy investment. A newsvendor model is constructed to determine optimal portfolio between renewable and non-renewable energy, taking into account subsidy fluctuation and supply intermittency. We conduct a trade-off analysis of capacity investment under uncertainty and present the managerial implication.

093-1646 How Does Energy Regulation Effect Environmental Performance?
Jiang Jiang Yang, Student, University of Science and Technology of China, China
Energy regulation has been recognized as an important way to directly improve environmental performance or indirectly impact environmental performance through increasing environmental innovation. The present paper constructs an energy and carbon emission total factor productivity index using the Malmquist-Luenberger productivity index.

093-0461 An Effective Echo State Network Bagging Ensemble Model for Electricity Energy Consumption Forecasting
Huanling Hu, Student, Huazhong University of Science & Technology, China
Lin Wang, Professor, Huazhong University of Science & Technology, China
Electricity energy consumption (EEC) forecasting is important for governments to make energy policies. We propose an ensemble model (BESN) based on bagged echo state network for EEC forecasting which combines the advantages of ESN and bagging. Results of comparative examples show BESN outperforms traditional ESN and other existing popular models.

Chair(s): Yunchuan Liu
093-0904 Return Channel Choice and Product Quality Decision with Uncertain Demand
Buqing Ma, Student, University of Science and Technology of China, China
Yunchuan Liu, Associate Professor, University of Illinois Urbana-Champaign, United States
Zhongsheng Hua, Professor, Zhejiang University, China
In this paper, we study a manufacturer’s return channel choice and product quality decision with uncertain demand. Counterintuitively, we find that the manufacturer can undertake the return activity directly where even the salvage value is less. We also show that product quality may increase with demand uncertainty.

093-1006 Strategic Inventories and Vertical Contracts in Multi-Echelon Supply Chains
Qing Wu, Associate Professor, University of Electronic Science and Technology of China, China
Established findings suggest that strategic inventory may alleviate double marginalization and improve the efficiency of a decentralized two-echelon supply chain. However, the role of strategic inventory in multi-echelon supply chains remains largely unexplored. In this paper, we examine the effect of strategic inventory in multi-echelon supply chains.

093-1501 Consumer Inter-Product Showrooming and Information Service Provision in an Omni-Channel Supply Chain
Tao Zhang, Assistant Professor, University of Electronic Science & Technology of China, China
Gang Li, Professor, Xi’An Jiaotong University, China
T.C.E. Cheng, Professor, The Hong Kong Polytechnic University, China
Stephen Shum, Associate Professor, City University of Hong Kong, Hong Kong
Omni-channel retailing is quickly becoming a predominant norm of the industry and has an increasingly significant impact on the whole supply chain. Our research analytically examines the impacts of consumer showrooming and firms’ information service provision on the supply chain performance and social welfare. Theoretical and managerial implications are provided.

093-0972 Is it Beneficial for the Retailer to Collaborate with a Consumer-to-Consumer Redistribution Platform?
Chen Pang, Student, Department of Logistic and Maritime Studies, China
Gang Li, Professor, Xi’An Jiaotong University, China
Li Jiang, Professor, Hong Kong Polytechnic Univ, Hong Kong
Retailers are aligning with a C2C redistribution platform to support consumers reselling used products. Our two-period model highlights a non-decreasing effect of the redistribution market size on new product demand. The retailer may generate higher revenue from charging different product prices in two periods depending on the market-clearing’s secondary price.

Contributed Session: Sports Operations and Leadership
Chair(s): Bosun Olaniyi
093-0378 Achieving Operational Sustainability in Elite Soccer: The Impact of the Sporting Director
Tony Asghar, Managing Director, Global Sports Management, United Kingdom
Sara Ward, Associate Professor, Manchester Metropolitan University, United Kingdom
### Saturday, 02:15 PM - 03:45 PM

**093-0269  Elite English Soccer - Boardroom Operational Effectiveness**

Robert Price, Head of Medical, Leeds United Football Club, United Kingdom  
Sara Ward, Associate Professor, Manchester Metropolitan University, United Kingdom  
David Bamford, Professor, University of Huddersfield, United Kingdom

We critically evaluated the boardroom operational effectiveness of six elite level soccer clubs in England. The governing structures failed to meet recommended standards from both business and sport perspectives. Board composition in terms of diversity, age, and expertise were all areas of concern. Operational impacts on clubs' competitive advantage were evaluated.

**093-0314  The Value of Emotional Intelligence in Sports Directorship**

Lee Dambrough, Head of Strategic Analysis and Recruitment, Hull City Football Club, United Kingdom  
Sara Ward, Associate Professor, Manchester Metropolitan University, United Kingdom  
Iain Reid, Reader, Manchester Metropolitan University, United Kingdom

This paper presents the value and impact of emotional intelligence between key stakeholders in terms of performance leadership and within an elite English football club (CEO / Manager). Specifically, how effective performance has been evaluated in strategic operations where there are not necessarily traditional measureable outcomes.

**093-0388  Elite Sports - The Utilization of Data Analytics and Technology**

Olatunbosun Olaniyi, Student, University of Huddersfield, United Kingdom  
Benjamin Dehe, Reader, University of Huddersfield, United Kingdom  
Sara Ward, Associate Professor, Manchester Metropolitan University, United Kingdom  
David Bamford, Professor, University of Huddersfield, United Kingdom

This research investigates the utilization of data analytics and technology in elite sports. 20 interviews with industry experts were used to gain insight into this phenomenon. Findings indicate that the utilization has increased, however, there are indications of a clear digital divide. This is examined.

**Saturday, 02:15 PM - 03:45 PM, Morgan**  
Track:  Public Sector Operations Management

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**270**  
**Invited Session:** Servitizing One-Stop Government Services

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<td><strong>093-1622  Developing and Improving Government Services: Contrasting Finland and Hungary</strong></td>
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Gyula Vastag, Professor, Szechenyi Istvan University, Hungary  
Markku Kuula, Professor, Aalto University, Finland  
Antero Putkiranta, Senior Lecturer, Lappeenranta University of Technology, Finland

After WWII, delivery of government services took different development paths in Finland and Hungary: more reliance on decentralized and online services in the former and more emphasis on one-stop government service centers in the latter. The paper uses comparable sets of services to highlight development options for both.

| **093-1636  Servitization of Administrative Public Services in Hungary** |

Laszlo Buics, Student, Szechenyi Istvan University, Hungary

The aim of this research is to examine how the concept of servitization can be applied within the framework of the Unified Services Theory on the Hungarian Government Windows. The results can help to identify improvement possibilities and reduce waiting times thus creating a more efficient and customer friendly service system.

| **093-1619  Mapping and Contrasting Improvement Options for One-Stop Government Service Centers in Hungary** |

Gyula Vastag, Professor, Szechenyi Istvan University, Hungary  
Agnes Jenei, Associate Professor, National University of Public Service, Hungary

Using concept-mapping, improvement options for selected – with contrasting population characteristics from the 300 or so units in Hungary – one-stop government service centers (offering up to 2,000 service types) were developed and contrasted. The output of this analysis was used to create an action plan for improvement.

**Saturday, 02:15 PM - 03:45 PM, Kalorama**  
Track:  Emerging Topics in Operations Management

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<th>Chair(s): Guangwen Kong</th>
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**271**  
**Invited Session:** On-Demand Platforms

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<th><strong>Chair(s): Guangwen Kong</strong></th>
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<td><strong>093-0628  Surge Pricing and Two-Sided Temporal Responses in Ride-Hailing</strong></td>
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Bin Hu, Associate Professor, Naveen Jindal School of Management, United States  
Ming Hu, Professor, University of Toronto, Canada  
Han Zhu, Student, Mcgill University, Canada

We study surge pricing from a temporal perspective capturing riders' and drivers' different response time to pricing changes. We identify an equilibrium of a price surge followed by a lower price and another equilibrium of a low price followed by a higher price which is superior to the former.

| **093-0771  On-Demand vs Pooled Transportation: Consumer Preferences and System Design** |

Kashish Arora, Student, Cornell University, United States
**Saturday, 02:15 PM - 03:45 PM**

**Chair(s):** Fanyin Zheng, Assistant Professor, Columbia University, United States
Karan Girotra, Professor, Cornell University, United States

We look at drivers of choice between on-demand cabs and a pre-determined and scheduled shuttle service. First, we estimate the “inconvenience costs” associated with shuttle platforms. Second, we use these estimates to design policy counterfactuals for determining the pricing scheme and optimal size of the shuttle service.

**093-1716** Harnessing the Double-Edged Sword via Routing: Information Provision on Ride-Hailing Platforms
Leon Chu, Assistant Professor, USC, United States
Zhiyi Wan, Associate Professor, University of Oregon, United States
Dongyuan Zhan, Assistant Professor, University College London, United Kingdom

We consider a ride-hailing platform that provides free origin and destination information to taxi drivers. Information provision is a double-edged sword: the drivers may choose to take more profitable riders via "strategic idling". We propose a routing policy that aligns the incentives and achieves the first-best outcome for large systems.

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**272**

**Saturday, 02:15 PM - 03:45 PM, Jay**

**Track: Emerging Topics in Operations Management**

**Invited Session: Blockchain-Driven Operations Management**
**Chair(s):** Fuqiang Zhang, Fasheng Xu

**093-1287** Inventory, Speculators, and Initial Coin Offerings
Jingxing (Rowena) Gan, Student, University of Pennsylvania, United States
Serguei Netessine, Professor, OID, United States
Gerry Tsoukalas, Assistant Professor, University of Pennsylvania, United States

Initial Coin Offerings (ICOs) are an emerging form of fundraising for Blockchain-based startups. We examine how ICO campaigns should be optimally designed in the presence of demand uncertainty and discuss the implications this new form of financing has for firm’s operational decisions and profits.

**093-2029** Blockchain and the Value of Operational Transparency for Supply Chain Finance
Jiri Chod, Associate Professor, Boston College, United States
Nikos Trichakis, Associate Professor, MIT, United States
Gerry Tsoukalas, Assistant Professor, University of Pennsylvania, United States
Henry Aspegren, Student, Massachusetts Institute of Technology, United States
Mark Weber, Scientist, IBM, United States

We develop a theory that shows signaling a firm’s fundamental quality to lenders through inventory transactions to be more efficient than signaling through loan requests. We argue that blockchain technology has the potential to enable inventory transaction verifiability more efficiently than traditional monitoring mechanisms.

**093-0917** The Ethics and Sustainability of Blockchain
Mehrnaz Khalajheyati, Student, University of Rhode Island, United States
Dara Schniederjans, Associate Professor, University of Rhode Island, United States

Blockchain technology has a strong potential to improve supply chain management by reducing time delays, human errors, and costs. In this presentation, results from a systematic literature review will be presented in order to derive both gaps and potential applications of blockchain technology specifically to supply chain sustainability and ethics.

**093-2179** Will Blockchain Disrupt or Bankrupt Supply Chains?
Sarah Sengupta, Assistant Professor, St.Cloud State University, United States
Sandee Jagani, Assistant Professor, Illinois State University, United States
Marouen Ben Jebara, Assistant Professor, University of South Carolina, United States

The latest craze of digital ledger technology (aka Blockchain) is creating waves across multiple industries, but particularly through supply chains and distributive manufacturing. The study explores the Blockchain’s taxonomy and its economic and environmental sustainability impact on supply chains. Ideas for future research are presented.

**093-2130** Information Transparency in Rationing Games
Yao Cui, Assistant Professor, Cornell University, United States
Vishal Gaur, Professor, Cornell University, United States
Jingchen Liu, Student, Peking University, China

Motivated by the new technologies such as Blockchain that enables information transparency in supply chains, we study the impact of information transparency on supply chain rationing games.
093-0845  The Effect of Organizational Structure in Learning from Near Misses
Juan Madiedo, Assistant Professor, Rotterdam School of Management, Netherlands
Helge Klapper, Assistant Professor, Rotterdam School of Management, Netherlands
Firms often fail to identify and learn from near-misses. Whereas previous research has focused on individuals as a source of such missed opportunities, we argue that the interplay between organization structure and environment significantly affects the likelihood of avoidance of failure. We use a computer simulation to explore these effects.

093-1711  Knowledge Sharing in Crowdsourcing Competitions: Role of Personality Traits
Indika Dissanayake, Assistant Professor, University of North Carolina Greensboro, United States
Sridhar Nerus, Professor, University of Texas Arlington, United States
In this study, we draw on the Big-Five Factor Model of personality to investigate the relationship between solvers' knowledge sharing behavior in a competitive crowdsourcing environment and their personalities (e.g., openness, conscientiousness, agreeableness, extraversion, emotional stability), as measured by the social tones manifested in their online posts.

093-1255  The Impact of Customer and Employee Engagement on Operations Performance
Abdel Latif Anouze, Assistant Professor, QU, Qatar
Several studies investigated the impact of employee or customer engagement on performance, however, few have studied the impact of both simultaneously on performance. This study investigates the integrated impact of both customer and employee engagement on bank performance. Performance is measured by DEA.

093-2363  Antecedents of Fuel-Efficient Vehicle Operation
James Cotton, Student, Air Force Institute of Technology, United States
Using the Theory of Planned Behavior (TPB), we investigate the antecedent-dependent relationships between intrinsic factors (e.g. intentions, beliefs, subjective norms) and reported factors (e.g. driving style, fuel efficiency, vehicle maintenance). We compare and contrast literature studying professional and civilian vehicle operators.

093-0520  Collateral-Based Financing and Inventory Theory
Vernon Hsu, Professor, Chinese Univ of Hong Kong, Hong Kong
Jing Wu, Assistant Professor, City University of Hong Kong, Hong Kong
Inventory can be pledged as collateral to obtain financial gains. In this research, we develop a parsimonious theoretical model on the inventory stock level and find that the optimal inventory is positively associated with expected risk-adjusted investment returns. We empirically confirm this using data from China commodity.

093-0667  Operational Risk Management: An Optimal Inspection Policy
Youngsoo Kim, Assistant Professor, University of Alabama Tuscaloosa, United States
Yuqian Xu, Assistant Professor, University of Illinois Urbana-Champaign, United States
In this paper, we consider the design of an optimal inspection policy for a financial services firm that aims to mitigate operational risk losses. We consider a principal-agent setting where the principal hires an inspection team to check the operational risk events periodically.

093-0711  Dynamic Invoice Discounting
Nilish Jain, Assistant Professor, London Business School, United Kingdom
Nishant Mishra, Assistant Professor, K.U.Leuven, Belgium
S. Alex Yang, Associate Professor, London Business School, United Kingdom
Yuxuan Zhang, Student, Tsinghua University, China
Using a proprietary dataset, we analyze the suppliers' and buyers' behavior on offering and accepting invoice discounting. This allows us to explore the economic reasons behind trade credit and invoice discounting, as well as the potential strategies for the platform to optimize its profit/growth.

093-1048  Do Analytical Models Explain Actual Payment Term Extensions for Supply Chain Finance?
David Wuttke, Assistant Professor, Ebs Business School, Germany
In part, analytical models explain actual payment term extensions for supply chain finance. Leveraging a large dataset, we study how supply chain finance/reverse factoring is actually used to extend payment terms. Contrasting actual decisions with predictions based on profit-maximizing assumptions, we discuss possible implications for normative models.

093-0945  Integrating Technology Within Community Emergency Response Team Operations
Steve Peterson, Virtual Operations Team Lead, Montgomery County CERT, United States
Montgomery County, Maryland Community Emergency Response Team (CERT) will share experiences from its virtual activations where technology was the key component to success. Virtual activations ranged from local level situational reporting to international level social media monitoring and data analysis.
### Human-AI Collaboration Approach to Enhance Social Media Response of Emergency Services

**Hemant Purohit**, Assistant Professor, George Mason University, United States

Ubiquitous adoption of social media has set high expectations for emergency responders to serve the public online. However, the information overload of social media requests to help challenges the emergency services. This work introduces a human-AI collaboration methodology to assist emergency services in effectively responding to online service requests.

### Socio-Technical System Hybrids: Social Media Data for Crisis Response

**Andrea Tapia**, Associate Professor, Penn State University, United States  
**Jess Kropczynski**, Assistant Professor, University of Cincinnati, United States  
**W.R. Grace**, Post Doc/Researcher, Pennsylvania State University, United States  
**S Halse**, Student, Pennsylvania State University Harrisburg, United States

The goal of this paper is to understand and design the socio-technical interface between emergency organizations and social media that delivers real time answers, driven by organisational questions and requirements and meet organizational issues of fit. Trained systems, volunteers, and analysts can both contribute directly to a shared information system and help process data.

### Incorporating Social Media into Emergency Exercises

**Amanda Hughes**, Assistant Professor, Brigham Young University, United States

Social media has proven useful for emergency managers, however, training emergency managers how to efficiently and effectively use social media in their practice remains challenging. To address these challenges, we discuss our research in the development of open source tools and exercises for incorporating social media training into emergency management.

### Near Optimal Policies for Dynamic Assortment Planning Under MNL Models

**Xi Chen**, Assistant Professor, New York University, United States  
**Yining Wang**, Student, Carnegie Mellon University, United States  
**Yuan Zhou**, Assistant Professor, Indiana University at Bloomington, United States

In this talk, we consider the dynamic assortment selection problem under an uncapacitated multinomial-logit (MNL) model. By carefully analyzing the revenue potential function, we propose an efficient trisection algorithm that achieves an item-independent regret bound of $O(\sqrt{T \log \log T})$, which matches information from theoretical lower bounds up to iterated logarithmic terms.

### Pricing Hype: Capturing Demand Hype or Stagnation in Dynamic Pricing

**Mengchenyu Zhang**, Student, University of Michigan, United States  
**Hyun-Soo Ahn**, Professor, University of Michigan, United States  
**Christopher Ryan**, Associate Professor, University of Chicago Booth School of Business, United States  
**Joline Uichanco**, Assistant Professor, University of Michigan, United States

With growing access to information (through social media, review aggregation websites), customers are increasingly influenced by word-of-mouth and by awareness of a product's scarcity when deciding to buy. We study a joint pricing and initial inventory problem where the demand distribution can be dynamically affected by past sales and/or inventory.

### The Impact of IPO on Peer-to-Peer Lending Platforms

**Maxime Cohen**, Assistant Professor, New York University, United States  
**Kevin Jiao**, Student, New York University, United States

Using large loans data, we infer the impact of initial public offering (IPO) on peer-to-peer lending platforms. We use several econometric tools and find that several metrics were affected by the IPO filing: the loans' performance decreased, borrowers' requirements diminished, and the acceptance rate inflated.

### Interpretable Optimal Stopping

**Velibor Misic**, Assistant Professor, University of California Los Angeles, United States  
**Florin Ciocan**, Assistant Professor, INSEAD, France

In this talk, we develop a new way of solving optimal stopping problems by directly finding policies in the form of binary trees from a sample of trajectories. We apply our approach to option pricing and show that it outperforms state-of-the-art methods while offering more interpretable and transparent policies.

### The Value of Speed: A Randomized Field Experiment in E-commerce

**Santiago Gallino**, Assistant Professor, The Wharton School, United States  
**Nil Karacaoglu**, Student, Kellogg School of Management, United States  
**Antonio Moreno**, Associate Professor, Harvard University, United States

We leverage a randomized field experiment to investigate the impact of website performance on online sales.
We investigate whether the credibility of a news item’s informational content influences the individual decisions of social media users on whether to share it, and if so, how strongly. We propose that some controls on the velocity of information benefit both social welfare and the platform.

Facing competition from online channels, it becomes a challenge task for brick and mortar pharmacies to secure loyal customers while maintaining the already low margin on over-the-counter medicinal products. We exploit a change on store promotion designs and identify the determinants of successful promotions that balance sales and margins.

This paper examines dynamic pricing decisions in a decentralized channel in a growing market where consumers may have fairness concerns when the retailer increases its price over time. We show that consumer fairness concerns have non-monotonic effects on firms’ optimal prices and can benefit both the manufacturer and the retailer.

Many retailers adopt membership-based premium shipping (PS) service to attract more consumers owing to the fast delivery. We develop a theoretical model where two competing e-retailers have the option of providing PS. Interestingly, we find that the PS may soften the competition and enable the retailers to charge higher prices.

Content producers often try to push certain information while being concerned about their careers and reputations. Even though the platforms provide content providers an opportunity to influence consumers, potential bias could distort these efforts. We investigate how media platforms’ bias interacts with informational manipulation and the implications of such interactions.

We develop models to jointly optimize the sites and sizes of charging stations, along with the coupled fleet charging and repositioning operations. Our nonlinear optimization model closely tracks EV energy levels and explicitly depicts stochastic charging operations. We conduct a case study with data sets of Car2Go’s operations.

We examine regulatory guidelines of surface water quality to curb nutrient pollution resulting from various farming activities. We formulate an optimization model that captures the government’s regulation decision taking into account farmers’ moral hazard issue. We obtain policy insights and guidelines along with a solution method for the problem.
Empirical Investigation on the Range Anxiety for Electric Vehicles

In markets where prices fluctuate frequently, customers often form reference prices that influence their purchase decisions in future periods. We develop a finite-horizon model of dynamic price competition between two firms when the prices of both firms affect a shared market reference price.

Modeling Customized Pricing Based on Multiple Attributes

Customized pricing entails quoting different prices by a seller to each customer request for a product. The choice of buying the product by a customer is a function of the quoted price, product attributes, and customer attributes. A logit model is developed to predict the outcome of customized pricing.

Time-Consistent, Risk-Averse Dynamic Pricing

We use a dynamic, coherent risk-measure to ensure that decisions are actually implemented and only depend on states that may realize. A transformation to a risk-neutral problem allows to easily incorporate risk-aversion into existing dynamic pricing systems. This also justifies using "conservative" estimates of selling probabilities.

An Optimal Hotel Pricing Model with Two Channels, Multiple Periods and Switching

The hotel pricing decision in multiple channels is important as shifting a buyer from one channel to another may result in lower returns. We present a two period, two channel pricing model with switching, and show that optimal price in the lower value channel gets higher over time.

Hedging the Drift: Learning to Optimize under Non-Stationarity

We introduce general algorithms with state-of-the-art dynamic regret bounds for non-stationary bandit settings. They capture applications in advertisement allocation and dynamic pricing in changing environments. We also conduct numerical experiments on the CPRM-12-001: On-Line Auto Lending dataset to demonstrate the superior performances.

Multi-Product Price Optimization Under a General Cascade Click Model with Filters

We consider a pricing problem for a set of products displayed on a list. We first analyze the optimization problem and then study the case where the parameters are unknown and need to be estimated through price experiments. For this case, we develop online algorithms with tight regret rates.
Detecting trends can help retailers determine effective personalized promotion plans. We introduce a personalized demand model that captures customer-trends from transaction data. Moreover, we develop a provably-good greedy approach for the promotion targeting problem. Using data from a large fashion retailer, we test our customer-trend model and the targeting algorithm.

We propose a model for exploiting information collected via condition monitoring of components in the field to dynamically prioritize repairs in a capacitated repair shop. In this paper, our objective is to maximize the long-run availability of a series system that comprises different repairable components.

We consider the condition-based maintenance of a component for which there is uncertainty about the parameters of the degradation process. These parameters are inferred with increasing accuracy using real-time signal observations in a Bayesian framework. By formulating this problem as a Markov decision process, we characterize the optimal policy.

We characterize the optimal inspection and retirement policy of a tool that maximizes the tool's lifetime value under mild conditions on economic and tool-related parameters.

In this research, we focus on a specific type of crowdshipping which deals with delivering shipments between distributed locations such as from restaurants, retail, grocery, and drug stores to customers within guaranteed time. Fast, high-quality algorithms are developed with consideration of strategic repositioning of crowdsourcees to enhance shipping efficiency.

We propose to introduce flexible delivery time slots as opposed to the standard fixed slots. Scalable optimisation methodology is developed. We empirically investigate the potential of introducing such slots to reduce costs and/or to improve revenue in a realistically-sized case study.

We introduce a setting in which in-store customers supplement company drivers and deliver online orders. Online order placements and in-store customer arrivals are highly stochastic. We develop two approaches: first, we focus on the system state when making decisions, then we incorporate probabilistic information about future orders and customer arrivals.
In a crowdsourced delivery system, providing incentives to non-professional delivery drivers so that drivers are willing to revise their predetermined trip schedules could potentially overcome the shortage of supply. This study proposes an integrated optimization method for determining parcel-driver matches, delivery routes, and incentives to drivers.

On-time performance is affected by factors such as process variation, arrival variation, production rate, and process time, all of which have detractors. These may include failure demand, rework, overproduction, availability, speed, and demand variation to name a few. This research explores choice of techniques for lead-time compression.

We identify process characteristics that can reduce manufacturing flow deviations. Our hypothesis is that reducing deviations at the workstation will improve the quality indicators. The hypothesis is evaluated by collecting quantitative data from three different plants within the Volvo Group. Preliminary results indicate the validity of the hypothesis.

In engineer-to-order (ETO) industries, rapid order fulfillment can yield a significant competitive advantage. Through in-depth case studies of three buyer-supplier dyads in the maritime industry, we study how to reduce order lead times in ETO supply chains.

Lea Six Sigma (LSS) has proved its value in services. However, only limited academic research is available on the empirical application of LSS in banking. To bridge this gap, this paper presents a comparative-case-approach highlighting the drivers, inputs, influencers, and outcomes of LSS in banking.

This study aims to examine the mediating effect of Learning Organization (LO) based on the relationship between Total Quality Management (TQM) and operational performance improvement. A survey was carried out and data was analyzed through multivariate techniques. Results show that an enhanced LO capability impacts performance improvement level through TQM application.

This study aims to investigate the effect of practitioners’ experience and generational differences in the adoption of Lean Production (LP) principles. A survey was carried out and data was analyzed based on multivariate techniques. Results show that different combinations between practitioners experience and generations entail higher likelihood of principles' adoption.
## Saturday, 02:15 PM - 03:45 PM

### 093-1788 Development of a 5S Maturity Model Through Entropy Measure

Rajan Ranjith Kumar, Student, Indian Institute of Technology Madras, India  
L.S. Ganesh, Professor, Indian Institute of Technology Madras, India  
Rajendra Chandrasekharan, Professor, Indian Institute of Technology Madras, India  

Research literature points to 5S, a simple yet powerful method, as the foundation of other quality practices such as Lean and TPM. This paper presents a novel 5S maturity model with thresholds defined using an entropy measure. An example of its application is provided.

### 093-0888 Approximate Dynamic Programming for Online Scheduling

Zitana Nenova, Assistant Professor, University of Denver, United States  
Dan Zhang, Associate Professor, University of Colorado Boulder, United States  
Manuel Laguna, Professor, University of Colorado Boulder, United States  

Dynamic appointment scheduling received considerable attention in recent years. We propose an approximate dynamic programming approach for the problem. Our approach is simulate-based and can accommodate rather complex system dynamics. We validate the approach using problem instances based on data from a public hospital in the US.

### 093-1700 Pain Management via Opioids: Incorporating Opioid Induced Hyperalgesia

Abdullah Gokcinar, Student, University of Texas Dallas, United States  
Metin Cakanyildirim, Professor, University of Texas Dallas, United States  

Use of opioids in pain management constitutes a significant challenge in healthcare. Underprescription of opioids yields inadequate pain-relief, while overprescription leads to ongoing opioid epidemic. Both are burdensome for the society. We study the optimum opioid-use decisions in an analytical (probabilistic) model under various prescription/treatment policies.

### 093-1371 Probabilistic Forecasting for Online Staffing Decisions in the Emergency Department

David Rea, Student, University of Cincinnati, United States  
Craig Froehle, Professor, University of Cincinnati, United States  

Evidence is mounting that point-estimate forecasts are inadequate inputs for operational planning decisions in highly uncertain environments. Probabilistic forecasting techniques, which quantify uncertainty, are rarely used for planning. This research compares the effectiveness of probabilistic forecasting versus point-estimate techniques for use in emergency department staffing decisions.

### 093-1126 Resolving the RACket: Improving Recovery Audit Contractor Policies for Medicare Reimbursement

James Abbey, Assistant Professor, Texas A&M University College Station, United States  
Neil Geismar, Professor, Texas A&M University College Station, United States  
Rogerio Oliva, Professor, Texas A&M University College Station, United States  

Medicare audits are deeply flawed. Medicare’s auditors recoup billions of dollars every year from hospitals without proper justification. The auditing flaws greatly hinder hospital management. Over 70% of such auditing reclamation are overturned within five years of appeals. This paper addresses these systemic flaws in the U.S. healthcare system.

### 093-0197 Hospital Readmission Reduction Program Does Not Provide the Right Incentives: Issues and Remedies

Kenan Arifoglu, Assistant Professor, University College London, United Kingdom  
Hang Ren, Assistant Professor, George Mason University, United States  
Tolga Tezcan, Associate Professor, London Business School, United Kingdom  

We study the effectiveness of Hospital Readmission Reduction Program (HRRP), which was recently introduced by Medicare. Using a game-theoretical stylized model, we find that HRRP may induce excess healthcare cost. We propose a new compensation scheme that results in socially optimal efforts in reducing readmissions.

### 093-0257 Outcomes-Based Reimbursement Policies for Chronic Care Pathways

Saša Zorc, Assistant Professor, Darden School of Business, United States  
Stephen Chick, Professor, INSEAD, France  
Sameer Hasija, Associate Professor, INSEAD, Singapore  

We present a novel outcomes-based reimbursement model for chronic care pathways. This model addresses the challenges of current reimbursement models by aligning incentives with patient outcomes. Our analysis yields significant improvements in patient care and healthcare costs.
We develop an outcomes-based model of contracting in-care for chronic patients using data from the United Kingdom's NHS. We consider the following obstacles for efficient contracting: disentangling contributions of providers, measurement noise, free-riding, and collusion. We demonstrate that individual outcomes-adjusted capitation contracts are the most resistant to these adverse effects.

### 093-0092  Effects of Staffing Rotation Patterns on Patients' Length of Stay

Kimia Ghobadi, Assistant Professor, Johns Hopkins University, United States  
Retsef Levi, Professor, MIT, United States  
Andrew Johnston, Student, MIT, United States  
Rhodes Berube, Administrative Director for Clinical Operations, MGH, United States  
Walter O’Donnell, Assistant Professor, MGH, United States

We quantify the effects of care-team rotation patterns on patients’ length-of-stay in Internal Medicine teams of a large academic medical center. A natural randomized control setting is identified based on the care-teams’ schedule. The results indicate a longer length-of-stay when the care-teams rotate shortly after a patient’s admission.

### 093-0249  The Impact of Facility Layout on Service Worker Behavior: A Study of ED Nurses

Lesley Meng, Student, The Wharton School, United States  
Robert Batt, Assistant Professor, University of Wisconsin-Madison, United States  
Christian Terwiesch, Professor, The Wharton School, United States

We study the impact of service facility layout on how service workers organize their tasks. We focus on the hospital emergency department as a service setting where nurses (servers) have discretion over how they interact with their patients (customers) in a facility that introduces significant heterogeneity in walking distance.

### 093-0364  Positional Flexibility and Consistent Assignment in Long-Term Care Staffing

Vincent Slaugh, Assistant Professor, Cornell University, United States  
Alan Scheller-Wolf, Professor, Carnegie Mellon University, United States

We study assignment of caregivers to residential households for each shift. We show that prioritizing part-time employees to work in their “home unit” can significantly improve consistency of care. Analysis of one facility’s schedules reveals a 40% possible reduction in the number of unique caregivers assigned to each household.

### 093-0223  Mixing it Up: Operational Impact of Hospitalist Workload

Masoud Kamalahmadi, Student, Indiana University, United States  
Alex Mills, Associate Professor, Baruch College, United States  
Jonathan Helm, Assistant Professor, Arizona State University, United States  
Kurt Brethauer, Professor, Indiana University, United States

Hospitalists are physicians that specialize in caring for hospital inpatients, replacing a primary care physician who may only make rounds once per day and thereby reducing delays. Given a limited number of hospitalists in a hospital, we seek to determine their optimal service mix (workload and patient types).

### 093-0532  Online vs Offline: How Should a Supplier Encroach on Its Retailer with Traffic Consideration?

Jie Zhang, Associate Professor, Guang Dong University of Finance and Economics, China

It is increasingly common for suppliers to encroach on its retailer with an online/offline direct channel. In this paper, we investigate a supplier’s decision on whether and how to encroach by considering the traffic congestion cost. We analyze the equilibrium strategies and identify the supplier’s channel preference under various conditions.

### 093-2151  Capacity Investment and Innovation in Supply Chains With Renegotiation

Qiaohai Hu, Assistant Professor, University of Missouri St. Louis, United States

This paper identifies ex ante initial agreements so that the supplier will build specialized capacity and invest in innovation at the channel-efficient level when both the supplier and the buyer anticipate possible ex post renegotiation of the initial agreements after uncertainties have been resolved.

### 093-1896  Pricing and Procurement Decisions with Partial Ownership Arrangement

Anshuman Chutani, Assistant Professor, University of Nottingham, United Kingdom  
Metin Cakanyildirim, Professor, University of Texas Dallas, United States  
Varun Gupta, Assistant Professor, Penn State University Erie, United States

We study a one supplier - two retailer supply chain where a retailer holds partial ownership in the common supplier. We determine prices and procurement quantities and study the influence of partial ownership on prices, quantity, and profits of the supplier and the retailers.

### 093-1499  Cost Sharing in a Shipping Market with Empty Container Repositioning

Rongying Chen, Assistant Professor, Soochow University, China  
Ying-Ju Chen, Associate Professor, Hong Kong University of Science and Technology, Hong Kong
We study the cost sharing and pricing issue in a shipping market with one carrier and two forwarders. The Stackelberg leader carrier authorizes forwarders to collect cargo at different ports and then transports laden/empty containers. We find that there is a salient conflict between profit maximization and ECR minimization.

**093-2209 The Serendipitous Benefits of Collaboration**

Stanley Fawcett, Professor, Weber State University, United States
Amydey Fawcett, Assistant Professor, Weber State University, United States
A. Knemeyer, Associate Professor, Ohio State University, United States
Sebastian Brockhaus, Assistant Professor, John Carroll University, United States
Yao Jin, Assistant Professor, Miami University, United States

Too often, managers lament that they can't make the case for greater collaboration. They don't have the numbers to justify the efforts. Our longitudinal inductive research shows that managers overlook—i.e., they fail to recognize and quantify—the serendipitous benefits of collaborative initiatives. We present a framework of collaboration benefits.

**093-0384 Depicting Collaborations in Microbrewery Supply Chains**

Maryam Lofti, Post Doc/Researcher, Cardiff Business School, United Kingdom
Vasco Rodrigues, Lecturer, Cardiff University, United Kingdom
Maneesh Kumar, Professor, Cardiff University, United Kingdom
Irina Harris, Associate Professor, Ms, United Kingdom
Mohamed Naim, Professor, Cardiff Business School, United Kingdom

We empirically explore, via interviews and focus groups, the preconditions, motivations, and potential areas for collaboration in a national region of the UK microbrewery industry. Findings suggest microbreweries are very open to collaboration, especially in knowledge transfer and internal operations, procurement, NPD, quality assurance, sharing market channels, and logistics.

**093-1311 Why and How Should Parcel Courier Logistics Providers Share First-Mile Collection Services?**

Xin WANG, Student, the University of Hong Kong, China
George Q. Huang, Professor, The University of Hong Kong, Hong Kong

In this paper, we investigate the outsourcing strategy of parcel courier logistics providers and the price decision of a common service provider which provides shared first-mile door-step collection service for competing logistics providers. Impacts of factors such as the sensitivity of the demand and operation costs are also evaluated.

**093-1790 Unpacking Trust Effect on Collaboration and Value Creation in Buyer-Supplier Relationships**

Guilherme Martins, Professor, Inper Institute for Education and Research, Brazil
André Duarte, Professor, Inper, Brazil
Raphael Nadruz, Student, Inper Institute for Education and Research, Brazil

This paper investigates if trust based on competence and goodwill differ in promoting collaborative relationships. We use structural equation modeling to analyze data from 200 dyads. Our major finding was that if we analyze collaborative activities that promote value creation, competence-based trust is more relevant than goodwill.

**093-0652 Sport Obergmeyer Revisited: From Point Estimates to Probabilities**

Asa Palley, Assistant Professor, Kelley School of Business, United States
Kenneth Lichtendahl Jr., Assistant Professor, Darden School of Business, United States
Yael Grushka-Cockayne, Assistant Professor, Darden School of Business, United States

We develop a procedure that can be used to estimate a predictive distribution using only point estimates from a collection of judges. We find that the approach slightly outperforms the linear opinion pool of full subjective probability distributions from two Surveys of Professional Forecasters.

**093-0709 Judgmental Adjustments in Forecasting: Implications and a Strategy for Improvement**

Rob Basten, Associate Professor, Eindhoven University of Technology, Netherlands
Bregje Van der Staal, Student, Eindhoven University of Technology, Netherlands
Philippe Van de Calseyde, Assistant Professor, Eindhoven University of Technology, Netherlands
Evangelia Demerouti, Professor, Eindhoven University of Technology, Netherlands
Ton De Kok, Professor, Eindhoven University of Technology, Netherlands

Statistical forecasts are typically checked and often adjusted by human planners. We use data from a company in forecasting services to investigate when adjustments improve forecasts and when they do not. Based on our findings we propose a new way of adjusting forecasts that is more efficient and improves the quality.

**093-1876 Interpretation of Contextual Information When Making Judgmental Adjustments in Forecasting**

Anna Sroginis, Student, Lancaster University, United Kingdom
Saturday, 02:15 PM - 03:45 PM

093-0936 Managerial Insight, "Optimal Algorithms," and Algorithm Aversion
Blair Flicker, Student, University of Texas Dallas, United States

In practice, optimal actions prescribed by stylized operational models are often regarded as recommendations. In the lab, I show that this approach (misspecified optimization, then managerial adjustment) performs poorly versus using managerial forecasts as inputs to optimization. However, managers may still deviate from the human-informed recommendations (i.e., "game" the system).

093-0119 The Role of Incentive Structure in Innovation Contests
Brian Lee, Assistant Professor, University of Massachusetts - Lowell, United States
Anant Mishra, Associate Professor, University of Minnesota, United States
Shun Ye, Assistant Professor, George Mason University, United States

Innovation contest platforms allow firms to harness solutions to business problems from individuals with diverse backgrounds and specialized skills. Using detailed data from a leading innovation contest platform for data science problems, we examine how the structure of incentives affects the quality and distribution of solutions in innovation contests.

093-1286 Contingent Stimulus in Crowdfunding
Longyuan Du, Assistant Professor, University of San Francisco, United States
Ming Hu, Professor, University of Toronto, Canada
Jiahua Wu, Assistant Professor, Imperial College London, United Kingdom

We study a model where backers arrive sequentially at a crowdfunding project. We characterize the dynamics of the pledging process. To boost success, we propose and characterize stimulus policies including feature upgrade and limited-time offer. Testing with the Kickstarter data, we demonstrate the benefit of the stimulus policies.

093-0264 The Impact of Open Innovation on Operational and Firm Performance
Flora W. W. Cheung, Student, ????, China
Rachel W.Y. Yee, Associate Professor, Institute of Textiles and Clothing, China
Andy C. L. Yeung, Professor, Department of Logistics and Maritime Studies, China

Firms are increasingly prevailing to adopt open innovation (OI) to create a collaborative community for product innovation. However, the impact of OI is under-researched. This research examines the effect of OI on operational performance and the contextual factors that affect this effect using the event study methodology. Implications are drawn.

093-1355 Crowd Voting Systems in Product Innovation: A Literature Review
Liang Chen, Assistant Professor, West Texas A&M University, United States

As open innovation, crowdsourcing, and co-creation are incorporated into the production innovation stage, various voting systems have been recently adopted by many organizations such as Dell and Toyota. This study reviews existing studies on the design and use of voting systems in product innovation and provides future research directions.

093-1495 The Impact of Supply Chain-Related Activities on Innovation Performance in Crowdfunding Platforms
Eun Ju Jung, Assistant Professor, George Mason University, United States
Cheryl Druelh, Associate Professor, George Mason University, United States

The global amount raised by crowdfunding platforms reached $34 billion in 2017. However, there has been limited attention given to the impact of supply chain-related activities on entrepreneurs' innovation performance. Using textual analysis, we identify SC activities and investigate the association between each activity and innovation performance.

093-2361 Inventory Hedging Against Demand and Production Time Uncertainties
Yongzheng Li, Assistant Professor, Jinan University, China
Miao Song, Associate Professor, The Hong Kong Polytechnic University, Hong Kong

This paper considers the production, inventory, and transportation decisions in a multi-item production-distribution network with uncertain demand and production time. We use inventory to hedge against uncertainties and derive bounds on hedging inventory through robust optimization approaches. The computational complexity and total unimodularity are analyzed. Extensive numerical experiments are conducted.

093-0038 Profit Allocation, Decision Sequence and Compliance Aspects of Coordinating Contracts: A Retrospect
Meng Lu, Model Reviewer, The Hong Kong and Shanghai Banking Corporation Limited, China
Suresh Sethi, Professor, University of Texas Dallas, United States
Yangyang Xie, Assistant Professor, University of Science and Technology of China, China
Saturday, 02:15 PM - 03:45 PM

Houmin Yan, Professor, City University of Hong Kong, China

We systematically review the profit allocation, decision sequence, and compliance aspects of coordinating contracts. We propose the notion of sample-path flexibility in profit allocation, demonstrate properties and sufficient conditions for these aspects, develop a framework for contract classification, and provide steps for designing sample-path flexibility and voluntary compliant coordinating contracts.

093-0635 An Order-Dependent Decomposition Approach for Capacitated Multi-Echelon Inventory Systems

Xiaobei Shen, Associate Professor, Univ Sci & Technol China, China
Yimin Yu, Assistant Professor, City University of Hong Kong, Hong Kong
Yue Wang, Student, University of Rochester, United States
Tim Huh, Professor, University of British Columbia, Canada

We consider optimal inventory replenishment policies for capacitated multi-echelon inventory systems. We introduce the notion of order-dependent decomposition and show that the optimal decisions can be made sequentially from the downstream stages first in each period. For each stage, an order-dependent echelon base stock policy is optimal.

294 Saturday, 02:15 PM - 03:45 PM, Columbia 12 Track: Service Operations

Contributed Session: Service Research in Education Operations

Chair(s): Barry Cross

093-0239 Productivity Improvement in a Service Organization by Implementing an Academic Management System

Namibrajan Thangasamy, Professor, Pondicherry University, India
Justin Joy, Student, Pondicherry University, India

This study aims to improve the productivity of a service organization, namely an academic institute, by gauging the impact of memos and training on their Academic Management System usage. Statistical tools, namely analysis of variance, Duncan's multiple range test, independent and paired-samples, and t-tests are used for investigating their statistical significance.

295 Saturday, 02:15 PM - 03:45 PM, Monroe Track: Purchasing and Supplier Management

Invited Session: Panel: CAPS Showcase 1

Chair(s): Thomas Choi

093-2414 CAPS Showcase 1

Thomas Choi, Professor, Arizona State University Tempe, United States
John Gray, Associate Professor, Ohio State University, United States
Robert Handfield, Professor, North Carolina State University, United States
Janet Hartley, Professor, Bowling Green State University, United States
Kevin Linderman, Professor, University of Minnesota, United States

CAPS Research conducts practical research requested by CPOs or CSCOs of its members. It recruits researchers from various universities with requisite expertise. In this session, researchers will present their recent projects, so the audience will get an overview of the type of leading-edge issues large Fortune-500 companies grapple with.

296 Saturday, 02:15 PM - 03:45 PM, Lincoln East Track: Empirical Research in Operations Management

Contributed Session: Service Operations Management

Chair(s): Kevin Burnard

093-0052 A Holistic Approach for Assessing Quality in Higher Education Institutions

Nidal Dwaikat, Post Doc/Researcher, Royal Institute of Technology (Kth), Sweden
This paper proposes a holistic model for assessing the quality of academic programs in higher education institutions (HEIs). PLS-SEM technique is utilized to empirically test the proposed model and hypothesis. The paper provides a holistic view in which it integrates input, process, and output perspectives in a conceptual model.

093-1137 Go Wide or Go Deep? Assortment Strategy and Order Fulfillment in Online Retail
Sanjith Gopalakrishnan, Student, University of British Columbia, Canada
Moksh Matta, Student, University of British Columbia, Canada
Mona Imanpoor Yourdshahy, Student, Sauder School of Business, UBC, Canada
Operational management of assortment variety introductions is critical in an online retail context. We employ an extensive e-commerce dataset to identify the impacts of a retailer's assortment strategy, measured along the two dimensions of assortment width and depth, on its order fulfillment performance, and its subsequent impact on future sales.

093-0563 Combining Efficiency and Resilience in Information Technology Consulting Services
Ben Schneider, Student, IE Universidad, Spain
Elena Revilla, Professor, IE Universidad, Spain
Pablo Lavado, Professor, Universidad del Pacifico, Peru
While existing literature has focused on the trade-off between efficiency and resilience, we develop a framework in which lean- and risk-management-oriented practices are strategically bundled to improve both efficiency and resilience. To test our hypotheses, we relied on a consulting service project database collected from a global IT company.

093-0012 Developing a Case Study Protocol to Support Case Research
Kevin Burnard, Assistant Professor, Western Connecticut State University, United States
This paper outlines the development of case study protocols towards supporting improved reliability. Based on a review of relevant literature, this research outlines the use of validity and reliability measures within operations management research. Following this review, the features of a robust case study protocol are outlined and discussed.

297
Saturday, 02:15 PM - 03:45 PM, Lincoln West
Track: Empirical Research in Operations Management
Invited Session: Empirical Research in Product Recalls
Chair(s): George Ball

093-0023 The Influence of Female Board Representation on Product Recall Decisions
Kaitlin Wowak, Assistant Professor, University of Notre Dame, United States
George Ball, Assistant Professor, Indiana University Bloomington, United States
Corinne Post, Associate Professor, Lehigh University, United States
Dave Ketchen, Jr., Professor, Auburn University, United States
We theorize that boards influence how firms decide to recall defective products and propose that as the proportion of female directors on a board increases, firms recall more products and do so faster. Using data on 4,271 recalls over a 12-year period, we find support for our theorizing.

093-0800 Technology Life Cycle, Firm Actions, and Product Recalls
Ujjal Mukherjee, Assistant Professor, University of Illinois Urbana-Champaign, United States
In this paper we analyze the impact of technology life cycle on product recalls. Further, we analyze the moderating impact of firm actions related to product and process changes on the relationship between technology life cycle and product recalls.

093-0764 When the Public Takes the Driver's Seat: Twitter Sentiment and Recall Timeliness
Christoph Schmidt, Student, ETH Zurich, Switzerland
David Wuttke, Assistant Professor, Ebs Business School, Germany
George Ball, Assistant Professor, Indiana University Bloomington, United States
We extend the literature on automotive recalls by examining how social media sentiment may shape the timing of a firm's quality decisions. Using a recurrent event Cox model, we find that negative Twitter sentiment increases the hazard of a recall, while positive Twitter sentiment decreases the hazard.

093-0165 Inspecting the Inspectors: The Influence of Gender and Customer Closeness on Product Quality Escapes
George Ball, Assistant Professor, Indiana University Bloomington, United States
Petit Kent, Assistant Professor, Loyola University of Chicago, United States
We present results of a behavioral experiment investigating factors that influence quality escapes from an inspection process. We determine if men and women are equally likely to allow product quality mistakes to escape an inspection step and how exposure to the actual customer directly or indirectly influences quality escapes.

298
Saturday, 02:15 PM - 03:45 PM, Jefferson East
Track: Panels & Meetings
Contributed Session: Doctoral Consortium 2
Chair(s): Ozge Sahin

093-2431 Doctoral Consortium 2
Ozge Sahin, Associate Professor, Johns Hopkins University, United States
This session is by invitation only for those doctoral students who have registered. The purpose of the POMS Doctoral Consortium is to help doctoral students maximize their chances of having a successful academic career.
Dynamics of Supply Disruption and Recovery: A Case Study From the Locomotive Manufacturing Sector
Shivraj Kanungo, Associate Professor, George Washington University, United States

AMP's new supplier, HF, was ill-equipped to identify manufacturing errors. This case study employs causal loops diagrams to scrutinize the dynamics associated with product failures and how those product quality risks were contained. We conclude by discussing how AMP could have mitigated much of this supplier-related quality risk.

Recovery of Manufacturing Sectors in Puerto Rico Post-Hurricane Maria: Assessing Disruption to Socio-Technical Systems
Jennifer Helgeson, Research Economist, National Institute of Standards and Technology, DOC, United States

The NIST Manufacturing Extension Partnership in Puerto Rico conducted two survey waves of manufacturers following Hurricane Maria. The methodology and preliminary findings are presented for this region where supply chain resilience is vital. Data relates to operational and infrastructure damage causing sales and payroll losses across manufacturing sectors.

Disruption Warning Signal Attributes' Effect on Firm Performance: Evidence from National Hurricane Center and Airlines
Rahul Pandey, Student, Ohio State University, United States
Hyunwoo Park, Assistant Professor, Ohio State University, United States
Johnny Rungtusanatham, Professor, Ohio State University, United States

We explore association of attributes of disruption warning signal and disruption trigger on firm performance. We investigate effect of timing and quality of information regarding a hurricane's likelihood of hitting an airport and information regarding variation in hurricane characteristics on airlines' on-time performance and decision to cancel flights.

Mitigation of Disruption Impacts on Supply Chain Networks with Fairly Distributed Unmet Demands
Mastoor Abushaega, Student, University of Oklahoma, United States
Andres Gonzalez, Assistant Professor, University of Oklahoma, United States
Theodore Trafalis, Professor, University of Oklahoma, United States

Disruptive events among supply chain networks (SCNs) could hinder the SCN performance and result in considerable unmet demands, leading to customers dissatisfaction. To meet customers' needs, we developed a mixed integer programming model to distribute the unmet demand fairly among all customers, while guaranteeing minimum service levels across the SCN.

An Empirical Examination of Bargaining Power and its Impacts on Supply Chain Performance
Woohyun Cho, Associate Professor, University of New Orleans, United States
Jian-Yu Ke, Assistant Professor, California State University Dominguez Hills, United States
Chaodong Han, Assistant Professor, Towson University, United States

We empirically examine how resource dependence among vertical partners may be bargained away through cash-conversion-cycles. We found that a focal firm gets compensated for its resource contribution with bargaining power over partners. Nevertheless, the focal firm may restrain its bargaining power when the need for collaboration with its partners prevails.

Supply Chain Analytics Curriculum/Course Design
Yao Zhao, Professor, Rutgers University, United States
Rashmi Sharma, Student, Penn State University University Park, United States
Weimei Chen, Associate Professor, Rutgers Business School, United States
Melissa Bowers, Associate Professor, University of Tennessee Knoxville, United States
Nick Vyas, Assistant Professor, University of South California, United States

In this panel, we invite several leading supply chain management programs to share their insights of integrating analytics into the supply chain management curriculum and courses, their successful stories and lessons learnt.

Evaluating Profitability of Remanufacturing Operations
Akshay Mutha, Assistant Professor, University of Vermont, United States

Saurabh Bansal, Assistant Professor, Penn State University University Park, United States
Daniel Guide, Professor, Penn State University University Park, United States

We compare different methods for evaluating profitability of remanufacturing operations. We show the application of our model to current industry practices.

Product Design and Waste Management Firm Operations
Avinash Geda, Student, University of Florida, United States
Saturday, 02:15 PM - 03:45 PM

Vashkar Ghosh, Assistant Professor, University of North Carolina Greensboro, United States
Gulver Karamemis, Assistant Professor, University of Rhode Island, United States
Asoo Vakharia, Professor, University of Florida, United States

With China recently banning import of recyclable waste generated in the United States (US), recycling firms across the US are facing the problem of warehouses filled with recyclables. In light of this, we ask how product design in terms of recycled/recyclable content impacts the operations of a waste management firm.

093-1798 Probabilistic Selling for Modeling Buyers' Uncertainty in Remanufactured Products Market
Behzad Esmailian, Lecturer, Western New England University, United States
Jianzhou Qi, Student, University at Buffalo, SUNY, United States
Sara Behdad, Assistant Professor, University at Buffalo, SUNY, United States

Probabilistic or opaque selling is a sale in which sales outcomes or product features are not revealed to buyers until the purchase is made. This study investigates the concept of probabilistic selling in the remanufacturing market in which consumers are uncertain of products' condition until after they make their purchase.

093-1060 Capacity Investment Strategies for Hybrid Manufacturing/Remanufacturing Systems: The Choice Between Shared and Dedicated Resources
David Francos, Professor, Hochschule Heilbronn, Germany
Stefan Minner, Professor, Technische Universität München, Germany
Miray Öner Közen, Post Doc/Researcher, Technische Universität München, Germany

We study capacity investment decisions under random demand and return into any combination of shared (flexible) and (re) manufacturing dedicated resources. We analytically derive optimal capacity investment policies and provide structural sensitivity results. We find that cases exist in which increasing correlation between demand and returns lowers the expected profit.

093-0437 Data-Driven Priority Policies to Enhance Customer Service and Revenue Opportunities Using Past Customer Interaction Information
Brett Hathaway, Student, University of North Carolina Chapel Hill, United States
Seyed Emadi, Assistant Professor, University of North Carolina Chapel Hill, United States
Vinayak Deshpande, Professor, University of North Carolina Chapel Hill, United States

Using data from a banking call center, we show how managers can reduce waiting times and increase sales opportunities by predicting caller abandonment and redialing behavior based on their history with the call center and then prioritizing callers based on the predictions.

093-0932 Stocking Under Uncertain Demand and Product Variety
Vashkar Ghosh, Assistant Professor, University of North Carolina Greensboro, United States
Anand Paul, Associate Professor, University of Florida, United States
Lingjiong Zhu, Assistant Professor, Florida State University, United States

We analyze the optimal stocking policy for a retailer, in a set-up with an arbitrary number of product variants of a single product, stochastic demand, and two-level consumer choice. We model and solve the problem in a benchmark single-period setting and in an infinite horizon setting.

093-1782 Customer Learning and Demand Prediction for Online Durable Goods: Insights and Operational Implications
Clark Pixton, Assistant Professor, Brigham Young University, United States
David Simchi-Levi, Professor, Massachusetts Institute of Technology, United States

Motivated by data from a large online retailer, we study online sales of durable goods, focusing on uncertainty about product quality, the customer-review enabled learning process, and substitution effects in large product categories. We discuss implications for new product introduction and dynamic pricing.
A Free Environmental Lunch? The Impact of Environmental Management Systems on Energy Efficiency

Seongkyoon Jeong, Student, Arizona State University, United States
Jaeseok Lee, Lecturer, The University of Auckland, New Zealand

Using fourteen years of plant-level panel data, this study shows that the adoption of ISO 14001, the representative EMS standard, decreases energy efficiency by approximately 4%. The results suggest two main mechanisms of the unintended consequence. More importantly, we find that process management capability alleviates the negative impact.

Data-Driven Generator Maintenance and Operations Scheduling Under Uncertainty

Beste Basci ficli, Student, Georgia Institute of Technology, United States
Shabir Ahmed, Professor, Georgia Institute of Technology, United States
Nagi Gebraeel, Professor, Georgia Institute of Technology, United States

This paper aims to effectively model and solve the maintenance and operations scheduling problem of a fleet of generators under unexpected failures. We propose a data-driven approach by considering degradation of the generators. Our results demonstrate the effectiveness of the proposed approach with significant cost savings and reductions in failures.

Overbooking in Network Energy Storage

Selva Nadarajah, Assistant Professor, University of Illinois at Chicago, United States
Danial Mohseni Taheri, Student, University of Illinois at Chicago
Theja Tulabandhula, Student, University of Illinois at Chicago, United States

Energy storage assets are critical to match supply and demand but often underutilized. Motivated by an ethanol merchant, we study the overbooking of capacity in a network of energy storage assets. We shed light on the benefits and risks of this practice and provide decision tools to set overbooking levels.

Electricity Demand-Response Programs: What is the Right Baseline?

Vishal Agrawal, Associate Professor, Georgetown University, United States
Safak Yucel, Assistant Professor, Georgetown University, United States

Demand response refers to the programs of utility firms under which customers are compensated to reduce their electricity demand as compared to an administratively set baseline. We study how different baseline designs affect the success of a demand response program by accounting for customers' participation and demand-shifting decisions.

Bayesian Quantile Regression Model for the Price-Setting Newsvendor Problem

Mahsa Mardikoraem, Student, University of Wisconsin - Milwaukee, United States

Quantile regression has been considered for estimating demand in price-setting newsvendor problems. In order to incorporate uncertainty about the model, we use Bayesian quantile regression. Our model provides predictive distributions for the optimal quantile of the demand and the expected profit given price. Implementation involves censored data and model selection.

A Bayesian Stochastic Frontier Model of Firm's Productivity

Jessie Nouri, Student, 1990, United States

Stochastic Frontier Model (SFM) is a regression with the ability to capture variations of production across various firms. This research develops a semi-parametric Bayesian SFM for predicting the productivity index across production lines within one firm. The distribution of efficiencies is modeled with mixture Gamma and Log-Normal priors.

Optimal Procurement Contracts Under Hidden Information and Actions About Supply Disruptions

Xi Shan, Student, University of Texas Dallas, United States
Chenglin Zhang, Post Doc/Researcher, Southern Methodist University, United States
Suresh Sethi, Professor, University of Texas Dallas, United States

We consider a single period problem where a buyer sources from a supplier whose reliability is private information and, therefore, the supplier's effort to improve reliability is unobservable (hidden action). We study the buyer's optimal procurement contracts.

Tech Firms' Coopetition Strategy in the Presence of Network Effects

Chao Ding, Assistant Professor, The University of Hong Kong, China

We build a game theoretical model to analyze the competition strategy of two competing tech firms, both smart device producers and service providers, in the presence of network effects in their services.
### Impact of Machine Learning-Based Price Promotion - Evidence from a Field Experiment

We present the first hybrid metaheuristic of combining reinforcement learning with tabu search algorithm (RLTS) for solving the max-mean dispersion problem using a dedicated Q-learning mechanism to locate promising regions when tabu search gets trapped in local optimum. The RLTS algorithm performs much better than state-of-the-art algorithms in the literature.

### To Share or Not to Share? Role of Modularity on Information Sharing in Network Standardization

IT standardization is defined as the network-wide implementation of common processes for informational exchange (e.g., blockchains, data interchange standards). Using a game-theoretic framework, we demonstrate the deleterious effects of heterogeneity in the technological modularities of partner firms via opportunistic information withholding, during the process of network standardization.

#### Saturday, 04:00 PM - 05:30 PM

**093-1186** To Share or Not to Share? Role of Modularity on Information Sharing in Network Standardization  
Sanjith Gopalakrishnan, Student, University of British Columbia, Canada  
Moksh Matta, Student, University of British Columbia, Canada  
Hasan Cavusoglu, Associate Professor, University of British Columbia, Canada

Leading OM scholars will share their views on various interesting OM research topics related to Public Sector OM. During the session we will discuss what is Public Sector OM research, how is this research different from other sectors’ research, major operational challenges, and most interesting research and teaching topics.

#### Saturday, 04:00 PM - 05:30 PM

**093-0787** Generation Expansion Planning Considering Health and Societal Damages - A Simulation-Based Optimization Approach  
Mark Rodgers, Assistant Professor, Rutgers Business School, United States

In this paper, a simulation-based, metamodeling approach is leveraged to quantify health damages associated with power grid expansion decisions by linking the outputs of generation expansion planning simulations with a screening tool that quantifies the human health damages from the electricity sector.

**093-1257** Water-Risk Issues in Sustainable Supply Chain Management  
Maximiliano Udenio, Assistant Professor, KU Leuven, Belgium  
Jan Fransoo, Professor, Kuehne Logistics University, Germany

In this talk we discuss water-risk in supply chains and the challenges in quantifying it. We introduce our water-risk screening framework for SCM and discuss current and future developments.

**093-2455** Prioritizing and Sequencing Wastewater Treatment for River-Basin in Developing Countries  
Kwon Gi Mun, Assistant Professor, Fairleigh Dickinson University, United States  
Jiyong Eom, Associate Professor, Kaist College of Business, South Korea  
Yao Zhao, Professor, Rutgers University, United States

Designing wastewater supply chains for riparian states has become a highly controversial policy issue because of their asymmetric externality relationships and vulnerability positions. The problem is particularly pronounced in low-income countries facing tight public budgets and development uncertainties. We develop the concept of wastewater management for riparian states by proposing

### Empirical Research on Emerging Topics

**093-0649** Operational Transparency: Showing When Work Gets Done  
Robert Bray, Associate Professor, Northwestern University, United States

I study how customers respond to operational transparency with parcel delivery data from Cainiao Network, the logistics arm of Alibaba. I show that customers punish early idleness less than late idleness leaving higher delivery service scores when track-package activities cluster toward the end of the shipping horizon.
In this paper, we discuss the impact of machine learning-based personalized discount promotion on consumer consumption behaviors. We further analyze the types of consumers who are more likely to adopt such promotions.

093-0934  Initial and Ongoing Trust in Public Sector Relational Contracts

Samantha Keppeler, Assistant Professor, University of Michigan Ann Arbor, United States
Karen Smilowicz, Professor, Northwestern University, United States
Paul Leonard, Professor, University of California Santa Barbara, United States

Relational contracts assume trust between firms, but trust is not solely between firms - it is also between people across firm boundaries. Using a qualitative, multiple-case study approach, this work identifies when and how interpersonal trust ought to be incorporated in models of relational contracts.

093-1093  Dynamic Pricing of the Ride Sharing Market in a Spatial Search Model

Jingting Fan, Assistant Professor, Penn State University State College, United States
Wenlan Luo, Assistant Professor, Tsinghua University, China
Liu Ming, Assistant Professor, Chinese Univ of Hong Kong (Shenzhen), China
Weiming Zhu, Assistant Professor, I E S E, Spain

We build a spatial search model to study the geographic dynamics among drivers. Utilizing data from a leading ride-sharing platform, we assess the impact of different pricing schemes on drivers' capacity distribution, platform profit, and consumer surplus.

093-1281  Vertical Probabilistic Selling Under Competition: The Role of Consumer Anticipated Regret

Yong Chao, Assistant Professor, University of Louisville, United States
Lin Liu, Assistant Professor, University of Central Florida, United States
Dongyuan Zhan, Assistant Professor, University College London, United Kingdom

Consumers are likely to regret purchasing random products when they obtain the less desirable alternative. We show that this anticipated regret works to the advantage of merchants that offer random products due to reverse quality discrimination which enlarges the perceived quality differentiation between the competing firms and softens competition.

093-1536  Empirically Estimating Strategic Behavior for Hotel Standby Upgrade Programs

Ovunc Yilmaz, Assistant Professor, University of Notre Dame, United States
Mark Ferguson, Professor, University of South Carolina, United States
Pelin Pekgun, Associate Professor, University of South Carolina, United States
Guangzhi Shang, Assistant Professor, Florida State University, United States

Using a major hotel chain's 16-month booking data, we empirically investigate the strategic behavior in the context of standby upgrades, a popular program offering availability-based, discounted premium room upgrades to customers.

093-2366  Team Decision Making in Operations Management

Jiawei Li, Student, University of Michigan - Ann Arbor, United States
Damian Beil, Professor, University of Michigan, United States
Stephen Leider, Associate Professor, University of Michigan Ann Arbor, United States

We consider how teams make operations decisions in two canonical settings: standalone Newsvendor inventory decisions (tactical decision-making) and Newsvendor under information sharing. We find that teams perform worse than individuals when making Newsvendor decisions and are more strategic in the information sharing game.

093-0944  The Impact of Social Learning on Consumer Subsidies for Green Technology Adoption

Hang Ren, Assistant Professor, George Mason University, United States
Tingliang Huang, Assistant Professor, Boston College, United States
Georgia Perakis, Professor, Massachusetts Institute of Technology, United States

To incentivize consumer adoption of expensive green-tech products, governments typically offer consumers subsidies through rebates and tax credits. Apart from subsidies, consumers' adoption decisions are usually also influenced by word-of-mouth information about product quality from earlier adopters. We study a government's optimal dynamic subsidy decision with social learning.

093-0060  Blockchain Adoption for Combating Deceptive Counterfeits

Pengwen Hou, Student, Tsinghua University, China
Swaminathan Jay, Professor, University of North Carolina Chapel Hill, United States

We discuss how blockchain technology can be used to combat deceptive counterfeits. We analyze the potential benefits and challenges of using blockchain in this context.
Saturday, 04:00 PM - 05:30 PM

We consider a market that consists of a manufacturer and a deceptive counterfeiter. The manufacturer can either use blockchain or signal through pricing to validate product authenticity. However, customers have privacy concerns around blockchain usage. We find that blockchain should be used when customers have intermediate distrust about products.

093-0610  How Does Traceability of Blockchain Change Multitier Food Supply Chains?
Lingxiu Dong, Professor, Washington University St Louis, United States
Puping Jiang, Student, Washington University St Louis, United States
Fasheng Xu, Student, Washington University St Louis, United States

Blockchain provides traceability and transparency which facilitate the supply chain to reduce waste during food contamination (e.g., E. Coli outbreaks). While people are excited by its promised benefits, it is not clear when such technology should be adopted and who really benefits from the adoption in multitier food supply chains.

093-0670  Blockchain Design for Supply Chain Management
Jasmine (Aichih) Chang-Shi, Student, Rutgers University, United States
Michael Katehakis, Professor, Rutgers University, United States
Benjamin Melamed, Professor, Rutgers University, United States
Jim (Junmin) Shi, Associate Professor, Tuchman School of Management, United States

We investigate the influence of Blockchain Technology (BCT) on Supply Chain Management (SCM), using a stochastic model, for a manufacturer that seeks to maximize the total expected discounted profit by jointly managing (i) blockchain design, (ii) production or ordering decisions, and (iii) dynamic pricing. We discuss analytical insights thus obtained.

093-1821  Platform Tokenomics
Jiri Chod, Associate Professor, Boston College, United States
Nikos Trichakis, Associate Professor, MIT, United States
S. Alex Yang, Associate Professor, London Business School, United Kingdom

We consider a dynamic model of a platform that matches buyers and sellers, and identifies a double-sided moral hazard that arises between the platform owner and users. We show that the resulting agency cost can be sometimes, but not always, mitigated by the use of blockchain technology and ICO financing.

093-2257  Policy Analysis of Material Convergence Challenges During Disasters
Raquel Froese Buzogany, Student, University of Lugano, Switzerland
Paulo Goncalves, Associate Professor, University of Lugano, Switzerland
Hugo Yoshizaki, Associate Professor, Universidade de Sao Paulo, Brazil

Material convergence poses significant challenges during disasters. This study is the first to map the feedback processes influencing its overall dynamics and to offer a comprehensive analysis on how multiple policies affect the system, shedding light on ways to address the challenges presented by material convergence.

093-2354  Stochastic Modelling in Collection Centers Operations
Irais Mora, Associate Professor, Tecnologico De Monterrey, Mexico
Marco Serrato, Associate Professor, Tecnologico de Monterrey, Mexico
Jaime Mora-Vargas, Associate Professor, Tecnologico De Monterrey, Mexico
Raha Akhavan, Associate Professor, Savanci university, Turkey

In-kind donations’ management in the aftermath of a disaster is key in many countries. This research proposes a Markov Decision Model to support decision making in collection centers that receive these donations.

093-0819  Dynamic Supplier Selection in Humanitarian Relief: A Multi-Stage Stochastic Programming Approach
Shaolong Hu, Post Doc/Researcher, Texas State University, United States
Zhijie Dong, Assistant Professor, Texas State University, United States
Jennifer Shang, Professor, University of Pittsburgh, United States

This study focuses on dynamic supplier selection for relief agencies. The duration of supplier contracts vary, mainly depending on minimum commitment quantity, maximum reserve quantity, uncertainty, and dynamic of demand. By using a multi-stage stochastic programming approach we identify strategies of supplier selection to improve efficiency of disaster response.

Saturday, 04:00 PM - 05:30 PM

Contributed Session: Material Convergence and Donation Management
Chair(s): Zhijie Dong

093-1821  Value Function Approximation for Last-mile Distribution in Humanitarian Relief
Robert Cook, Assistant Professor, Northeastern Illinois Univ, United States
Emmett Lodree, Associate Professor, University of Alabama Tuscaloosa, United States

This study describes a Value Function Approximation approach for solving a Markov Decision Problem in which we distribute stochastically-arriving donations to disaster survivors. Donations accumulate over time at collection sites and are periodically transported to a relief center where the donations are distributed to beneficiaries over a finite horizon.

093-2354  Stochastic Modelling in Collection Centers Operations
Irais Mora, Associate Professor, Tecnologico De Monterrey, Mexico
Marco Serrato, Associate Professor, Tecnologico de Monterrey, Mexico
Jaime Mora-Vargas, Associate Professor, Tecnologico De Monterrey, Mexico
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Shaolong Hu, Post Doc/Researcher, Texas State University, United States
Zhijie Dong, Assistant Professor, Texas State University, United States
Jennifer Shang, Professor, University of Pittsburgh, United States

This study focuses on dynamic supplier selection for relief agencies. The duration of supplier contracts vary, mainly depending on minimum commitment quantity, maximum reserve quantity, uncertainty, and dynamic of demand. By using a multi-stage stochastic programming approach we identify strategies of supplier selection to improve efficiency of disaster response.
The Impact of Renewable Energy Forecast Errors on Imbalance Volumes and Electricity Spot Prices

We study the impacts of social comparison behavior of firms on CSR in a supply chain. We consider two types of social comparison behavior, ahead seeking and ahead averse, and two types of firms, large enterprises and SMEs.

Supply chain visibility (SCV) is becoming a popular tool for mitigating risks in supply chains. We use U.S. conflict minerals disclosures to assess the extent of firms’ SCV and test its impact on operating performance. We find that firms with higher SCV achieve improved profitability, sales, and market value.

Partnering with Goodio, a Finland-based craft chocolate producer, we explore how consumers react to value-based and evidence-based messaging regarding environmental and social initiatives. We test the effects of transparency in three markets (US, Finland, and Japan) with both online and field experiments.

We show that both the network size and asymmetry of manufacturers play a pivotal role in manufacturers and retailer decisions.

This study draws upon research regarding halo effect in marketing to test a direct effect of extrinsic attributes on crowdfunding performance. We also demonstrate the moderating role of market conditions on platforms. We extract the dataset of 6493 JD Crowdfunding projects from September, 2014 to September, 2017.

We consider a manufacturer who sources from an unreliable supplier. The supplier can take costly effort to improve reliability, but has private information about either its initial reliability or improvement cost. We examine which types of asymmetric information the manufacturer should obtain to better improve the profit.

Improving product attributes often requires joint efforts between a supplier and a buyer. We study how interdependencies of the efforts affect the equilibrium outcome of improved product attributes. We give insights on how transfer price and timing of improvement efforts help to achieve better performance.
Using data from the German electricity market, we investigate the effect of wind and solar energy forecasts’ errors on imbalance volumes and intraday spot electricity prices. We use OLS and quantile regressions and autoregressive moving averages to identify these relationships using variables that have a quarter-hourly data granularity.

093-0738  Anticipated Regret During Auctions: Empirical Evidence From eBay
          Meisam Hejazi Nia, Senior Data Scientist, HomeAway, United States
          Ozalp Ozer, Professor, University of Texas Dallas, United States
          Serdar Simsek, Assistant Professor, University of Texas Dallas, United States

Onion is an indispensable ingredient of the Indian diet and plays a vital role in the Indian economy, society, and politics. We examine the pricing ordeal in India’s onion markets. We discuss the option of introducing a processed substitute and whether it should be managed by non-profits.

317  Saturday, 04:00 PM - 05:30 PM, Embassy  Track: Environmental Operations Management
     Invited Session: OM for Developing Countries/Emerging Economies
     Chair(s): Nur Sunar

093-0261  Optimal Seeding Policy Under Rainfall Uncertainty
          Ying (Maggie) Zhang, Assistant Professor, Clemson University, United States
          Jayashankar Swaminathan, Professor, University of North Carolina Chapel Hill, United States

We study the optimal seeding policy of a single crop under rainfall uncertainty and show the optimality of the threshold-type policy. Using a real-size problem, we show that the relative yield advantage of the optimal policy over commonly used heuristics increases as the climate condition becomes more severe for planting.

093-1393  Operational Challenges in a Medical Transportation Platform in India
          Andre Calmon, Assistant Professor, INSEAD, France
          Stef Lemmens, Post Doc/Researcher, INSEAD, France
          Gonzalo Romero, Assistant Professor, University of Toronto, Canada
          Luk Van Wassenhove, Professor, INSEAD, France

We model and analyze the operational challenges faced by a medical transportation platform in India. In many developing countries, there is no centralized ambulance dispatcher. Therefore, patients must call their local hospital or hire a private ambulance, resulting in long waiting times for patients and costly routes for ambulances.

093-1776  Inconvenience, Liquidity Constraints, and the Adoption of Off-Grid Lighting Solutions
          Bhavani Shanker Uppari, Assistant Professor, Singapore Management University, Singapore

We investigate the efficacy of rechargeable lighting models under poverty. In collaboration with a firm in Rwanda, we collected the bulb usage data from randomized experiments. We build a structural model that incorporates the light consumption dynamics and use it to evaluate changes to the existing model.

318  Saturday, 04:00 PM - 05:30 PM, Du Pont  Track: Revenue Management and Pricing
     Invited Session: Emerging Topics in Pricing and Revenue Management
     Chair(s): A. Serdar Simsek

093-0047  A Field Experiment on Airline Lead-in Fares
          Maxime Cohen, Assistant Professor, New York University, United States
          Alexandre Jacquillat, Assistant Professor, Heinz College of Information Systems and Public Policy, United States
          Juan Camilo Serpa, Assistant Professor, Mcgill University, Canada

Commonly, airlines set their lead-in fare by matching competitors. We challenge this practice by partnering with a leading airline and running a field experiment. We propose a multi-control-group experimental design to estimate the treatment effect. Results show that lead-in differentiation can increase revenue and yield significantly (without decreasing market share).

093-1108  Revenue Management in Crowdfunding
          Jiding Zhang, Student, The Wharton School, United States
          Senthil Veeraraghavan, Professor, Wharton School, University of Pennsylvania, United States
          Sergei Savin, Professor, University of Pennsylvania, United States

We develop a model of crowdfunding dynamics by optimizing both the pledge level sought from donors or backers and the duration of the campaign. Our model aligns with the patterns of backer/donor pledging observed on crowdfunding platforms. We show how campaigns with high goals benefit from uncertainty.

093-1705  Price Equilibrium Under Heteroscedastic Exponential Choice
          Aydin Alptekinoglu, Associate Professor, Penn State University University Park, United States
          John Semple, Professor, Southern Methodist University, United States

I will discuss the price equilibrium among an oligopoly of single-product firms under HEC. Theoretical interest is the impact of heteroscedasticity on equilibrium prices, which is new to the discrete choice literature. Empirical interest of the equilibrium is unique and it can be very easily computed.

093-1533  Anticipated Regret During Auctions: Empirical Evidence From eBay
          Meisam Hejazi Nia, Senior Data Scientist, HomeAway, United States
          Ozalp Ozer, Professor, University of Texas Dallas, United States
          Serdar Simsek, Assistant Professor, University of Texas Dallas, United States
We develop a structural model that accounts for bidders’ learning and their anticipation of winner and loser regrets in an auction platform. Using a data set from eBay, we quantify the anticipation of regret and show how our results can be used to increase eBay’s revenue significantly.

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<td>Data Science</td>
<td>Yau Bozer, Alejandro Vigo Camargo</td>
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<td>093-1141</td>
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Firms need accurate forecasts of product life cycles to make operational decisions. We develop a first of its kind exponential smoothing model with a life-cycle trend. We demonstrate empirically that the model can capture a wide range of skewed diffusions and outperforms leading models in out-of-sample point and quantile forecasting.

We observe retailers aggressively expanding in both online and offline channels, we study a data analytics approach enabling omni-channel retailers to optimize location, assortment, and inventory decisions to maximize profits. We develop an efficient reformulation to solve the proposed decision model, and draw interesting observations that can be valuable to practitioners.

We study the problem of estimating the primary origin-destination demand for a bike-sharing service using trip data. To account for choice substitutions, we propose a rank-based demand model and an efficient estimation procedure that is provably consistent. Our approach is practical to implement at a city scale.

This paper studies supply chain network design which jointly optimizes the warehouses locations, the warehouse-retailer assignments, the multi-echelon inventory replenishment policy, the safety stock decisions, and the trade credit to minimize the total systemwide costs. A polymatroid cutting-plane approach is adopted to solve the MIP model with nonlinear terms.

In order to avoid business redundancy, this study proposes a demand identification method of customized MES based on information systems collaboration. This collaboration follows the business logic of production process and supports production planning and manufacturing sites. The case shows that customized MES can be effectively connected to other systems.

Managing the Multi-Node Replenishment Logistics in the Food Supply Chain

Nilakantan Narasinganallur, Alejandro Vigo Camargo, Yavuz Bozer

Managing the Multi-Node Replenishment Logistics in the Food Supply Chain

Nilakantan Narasinganallur, Alejandro Vigo Camargo, Yavuz Bozer
The main objective of this study is to develop an optimization model to minimize the cost of the replenishment logistics in the outbound portion of a fast food supply chain by minimizing the distance traveled and trucks needed while meeting service level and capacity limitations.

093-1342 Dynamic Optimization of Shared Inventory Resources
Yi Lu, Student, Peking University, China
Lihua Chen, Professor, Peking University, China

Inspired by Cainiao, a famous logistics company in China, the paper analyzed a dynamic allocation problem for inventory transfer among warehouses and coordinated distribution to markets in consideration of time change. An accurate algorithm and a heuristic algorithm were applied to solve a real problem in Chinese logistics network programming.

093-1865 Impact of Time Window Policies on Supply Chain Costs
Arpan Rijal, Student, Erasmus University Rotterdam, Netherlands
Marco Bilyank, Assistant Professor, University of Calgary, Canada
René De Koster, Professor, Rotterdam School of Management, Netherlands

Sustainability driven time window policies have significant impact on secondary transportation cost for retailers. In this work, we reassess time window policies’ impact more holistically. A joint approach that considers warehouse operations and transport planning can mitigate the negative financial impact of time window policies for retailers.

093-0699 Vehicle Routing for Mid-Day Meal Scheme of ISKCON Annamrita
Nilakantan Narasinganallur, Associate Professor, KJ SIMSR, India

We solved a vehicle-routing problem for Annamrita-ISKCON for their mid-day-meal scheme and routing deliveries to different schools in Mumbai. Different sections of the problem were solved and forty percent fuel savings were achieved with appropriate modeling in Excel and solved with Frontline Solver. The presentation will discuss the results and conclusions.

093-1341 Implementation of Process Change: A Mixed Methods Study in Healthcare
Gopesh Anand, Associate Professor, University of Illinois Urbana-Champaign, United States
Aravind Chandrasekaran, Associate Professor, Ohio State University, United States
Luv Sharma, Assistant Professor, University of South Carolina, United States

We studied the implementation of new standard practices for the patient education process in a kidney transplant unit using a mixed methods approach. Statistical results confirm the efficacy of the process change and provide preliminary support for the refinements to conventional organizational learning perspectives proposed based on our case study.

093-1539 When Events Violate Expectations: Learning During Quality Improvement Projects
Adrian Choo, Assistant Professor, Michigan State University, United States
Lawrence Fredendall, Professor, Clemson University, United States
Jamison Kovach, Associate Professor, University of Houston, United States

This research examines how individual learning in group problem solving can occur through situations that conflict with personal and group expectations. Implications regarding improved learning during problem solving activities will be discussed.

093-1654 Continuous Improvement: A Tension Between Performance Management and Social Support
Ambra Galeazzo, Post Doc/Researcher, Universita Degli Studi Di Padova, Italy
Andrea Furlan, Professor, Padova University, Italy
Andrea Vinelli, Professor, Universita Di Padova, Italy

As literature highlights that employees’ support leads to continuous improvement (CI), does it mean that managers should abdicate an authority-driven perspective? We investigate how performance management (a combination of stretch and discipline) and social support (a combination of trust and support) interact to enhance CI and firm performance.

093-0689 Reducing Medication Errors Using LSS Methodology in Thai Hospitals
Jiju Antony, Professor, Heriot-Watt University, United Kingdom

Medication error is one of the primary causes of patient mortality that cannot be resolved by healthcare practitioners. Lean Six Sigma is applicable in reducing errors from the medication process. Action research methodology was used to explore the implementation of Lean Six Sigma through the collaboration between the researcher and participants.

093-0696 Continuous Improvement Initiatives for Dynamic Capabilities’ Development: A Systematic Literature Review
Leopoldo Gutierrez, Associate Professor, University of Granada, Spain
Jiju Antony, Professor, Heriot-Watt University, United Kingdom

We propose a systematic literature review of dynamic capabilities’ initiatives using the ideas and techniques of Lean Six Sigma. The study is designed to analyze the key factors that contribute to the development of dynamic capabilities. This study aims to understand the relationship between Lean Six Sigma and dynamic capabilities and provides insights for practitioners and researchers.
Saturday, 04:00 PM - 05:30 PM

Despite the reputation of initiatives such as Lean Management, Six Sigma, or TQM, their effects on long-term benefits are fraught with controversy. This study performs a systematic literature review on these initiatives and dynamic capabilities development as framework to analyze how firms can sustain their advantage over time.

093-0702 Continuous Improvement Deployment Models: A Review and Propositions for Future Research
Bart Lameijer, Assistant Professor, University of Amsterdam, Netherlands
Jiju Antony, Assistant Professor, Heriot-Watt University, United Kingdom
Ronald Does, Professor, University of Amsterdam, Netherlands

This research provides a systematic overview of the available academic- and practitioner- based guidance for continuous improvement deployment in organizations. Based upon the research framework, ultimately 16 CI, deployment models are aggregated into a meta-CI deployment model, which is the basis for scientific grounding and various propositions for future research.

093-0700 Lean Six Sigma Readiness Within a UK Public Utility Sector
Bryan Rodgers, Assistant Professor, Heriot-Watt University, United Kingdom
Jiju Antony, Professor, Heriot-Watt University, United Kingdom

This research has been carried out in an organization preparing to launch a strategic commitment to a Lean Six Sigma initiative. 150 staff participated in the assessment of the organizations’ readiness to develop the initiative and identify strengths and necessary improvements to maximise their likelihood of success and sustainability.

093-0198 Aiding the Prescriber: Sounding the Alarm on Opioids
Margret Bjarnadottir, Assistant Professor, University of Maryland, United States
David Anderson, Assistant Professor, Villanova University, United States
Ritu Agarwal, Professor, University of Maryland, United States
Kislaya Prasad, Professor, University of Maryland, United States
Alan Nelson, Managing Member, InnoLytics llc, United States

The ongoing opioid epidemic is a serious public health issue. We investigate the feasibility of early detection of chronic opioid use and build advanced machine learning models that can be incorporated into clinical decision support systems, potentially minimizing adverse events associated with chronic opioid use and dependency.

093-0502 Using Social Determinant to Predict Health Outcomes
Min Chen, Assistant Professor, Florida International University, United States
Rema Padman, Professor, Carnegie Mellon University, United States

We integrate social determinant data into patient level clinical information and examine how this data integration will affect predictive accuracy of health outcomes.

093-1436 How AI Plays its Tricks: Interpreting the Performance of Deep Learning in Predicting Healthcare Costs
Weiguang Wang, Student, University of Maryland, United States
Margret Bjarnadottir, Assistant Professor, University of Maryland, United States
Guodong Gao, Associate Professor, University of Maryland, United States

This study developed and interpreted the superior performance of an LSTM-Based Deep Learning model in healthcare cost prediction. The better performance of the LSTM model compared with five traditional machine learning models was interpreted in three ways: subgroup examination, fluctuation analysis, and model design investigation.

093-1946 Pricing Schemes and Physician Engagement in Physician-Oriented Online Healthcare Community: A Regression Discontinuity Approach
Seyoung Seol, Student, Indiana University Bloomington, United States
Lu (Lucy) Yan, Assistant Professor, Indiana University Bloomington, United States
Jingjing Zhang, Assistant Professor, Indiana University Bloomington, United States
Hillol Bala, Associate Professor, Indiana University Bloomington, United States
Lian Wang, Student, Harbin Institute of Technology, China

We study how physician engagement changes under different pricing schemes. By examining the effects of an intervention to promote paid consultation service on an online platform, we found that physicians make more effort to attract prospective patients using free service at the expense of their engagement in providing paid service.

093-0040 Flexible FDA Approval Policies
Fernanda Bravo, Assistant Professor, UCLA Anderson School of Management, United States
Taylor Corcoran, Student, UCLA Anderson School of Management, United States
Elisa Long, Associate Professor, UCLA Anderson School of Management, United States
The USFDA requires clinical trial evidence that is statistically significant at the 2.5% level when approving drugs, but the agency often uses discretion when interpreting these standards. We propose a queueing model of the drug approval process, which incorporates factors such as disease severity, prevalence, and availability of existing therapies.

093-1922  Timing it Right: Balancing In-Patient Congestion versus Readmission Risk at Discharge  
Pengyi Shi, Assistant Professor, Purdue University, United States  
Jonathan Helm, Assistant Professor, Kelley School of Business, United States  
Jivan Deglise-Hawkinson, Analytics, ????, Singapore  
Julian Pan, CEO, ????, United States  
When to discharge a patient plays an important role in hospital patient flow management as well as quality of care and patient outcomes. In this work, we develop and implement a practical decision support tool to aid hospitals in managing the delicate balance between individual readmission risk and ward congestion.

093-0488  Unintended Consequences of Hospital Regulation: The Case of the Hospital Readmissions Reduction Program  
Christopher Chen, Student, London Business School, United Kingdom  
Nicos Savva, Associate Professor, London Business School, United Kingdom  
We examine the impact of the Hospital Readmissions Reduction Program (HRRP) on hospitals' admission decisions. We find that hospitals exposed to HRRP penalties increased observation admissions, which do not count towards readmissions, by 16.9% compared to non-penalized hospitals, and by as much as 40.6% if they were also financially constrained.

093-0889  Do Hospital Closures Improve the Efficiency and Quality of Other Hospitals?  
Lina Song, Student, Harvard University, United States  
Soroush Saghafian, Assistant Professor, Harvard University, United States  
We study the impact of hospital closures on the surrounding hospitals' efficiency and quality. We find that hospital closure results in improvement in efficiency at nearby hospitals, but there is an unintended negative consequence in quality through a reduction in service duration and an increase in 30-day mortality.

093-0270  Using Transaction Data to Improve Consumer Returns Forecasting  
Guangzhi Shang, Assistant Professor, Florida State University, United States  
Erin Mckie, Assistant Professor, Ohio State University, United States  
Mark Ferguson, Professor, University of South Carolina, United States  
Michael Galbreth, Professor, University of Tennessee Knoxville, United States  
Although an accurate returns forecast is preliminary for many decision support tools for managing returns, the development methods in this area received relatively little attention. We propose a new approach and benchmark its performance against a number of existing methods using two real world datasets.

093-0274  Utility-Owned Combined Heat and Power and Sustainability  
Eric Webb, Assistant Professor, University of Cincinnati, United States  
Gilvan Souza, Professor, Indiana University Bloomington, United States  
Owen Wu, Associate Professor, Indiana University, United States  
Combined heat and power (CHP) plants generate electricity and heat at the same time, which can be used by on-site firms for space and process heating. CHPs have higher efficiency and lower emissions than separate generation. We study the economics of utility ownership of CHP under different regulatory scenarios.

093-0806  Understanding the Choice of Online Resale Channel for Used Electronics  
Gokce Esenduran, Assistant Professor, Purdue University, United States  
James Hill, Associate Professor, Ohio State University, United States  
In Joon Noh, Student, Ohio State University, United States  
Individuals can sell their used electronic devices to independent parties, original equipment manufacturers, or other individuals through online marketplaces. To understand the choice among different resale channel alternatives, we conduct a series of discrete choice experiments and estimate sellers' utility functions using multinomial logit models.

093-1021  Pricing in Remanufacturing Operations  
Akshay Mutha, Assistant Professor, University of Vermont, United States  
Saurabh Bansal, Assistant Professor, Penn State University University Park, United States  
Daniel Guide, Professor, Penn State University University Park, United States  
We consider a firm that can remanufacture products after the demand is realized. We analyze the effect of postponing remanufacturing operations on the pricing decisions of a firm. We show the application of our model using industry data.
Motivation to change is essential for transformations, but how does it develop in digital supply chain endeavors? Analyzing more than 1600 codes through 17 case studies, based on large, international, long-established companies, we identify how motivation drives, via discomfort, learning anxiety, and psychological safety, the stages of this digital transformation.

The antecedents of customer satisfaction in online groceries among Indian consumers are determined using survey research method. Data analysis employing PLS-SEM approach presents the significance of responsiveness, transaction and monetary value, but the non-significance of reliability, product features, and functionality contrast the findings in developed nations' context.

We propose a new business model to ascertain under what circumstances a warehouse operator would outsource the automation service. From the automation provider's viewpoint, we examine the choice of service level and the impact of various negotiation powers.

This paper investigates the business model selection and store brand introduction in a supply chain consisting of a national brand manufacturer and an online retailer under different power structures. We comprehensively analyze four different scenarios and obtain the equilibrium decisions of business model strategy and store brand strategy.

In this study, we provide a nuanced understanding of the multifarious implications of how change orders in manufacturing environments influence plant productivity, product quality, and market performance using a proprietary database. Our findings indicate differential effects based on the source of change orders and different dimensions of performance.

Although farm equipment sharing is considered a novel approach for improving societal outcomes in emerging economies, it has not been successful in several African countries. We develop an analytical model to interrelate operational decisions of key stakeholders (equipment manufacturer, local intermediary, government, and farmers) and examine their impact on society.

Although farm equipment sharing is considered a novel approach for improving societal outcomes in emerging economies, it has not been successful in several African countries. We develop an analytical model to interrelate operational decisions of key stakeholders (equipment manufacturer, local intermediary, government, and farmers) and examine their impact on society.

We propose a new business model to ascertain under what circumstances a warehouse operator would outsource the automation service. From the automation provider's viewpoint, we examine the choice of service level and the impact of various negotiation powers.
Craig Carter, Associate Professor, Arizona State University Tempe, United States
Kefeng Xu, Professor, University of Texas at San Antonio, United States

We empirically study how a firm's GHG emissions reduction initiatives may have impacted its supply chain environmental performance and we further explore the mechanisms through which the impact may have occurred.

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**BOM Junior Scholar Paper Competition Finalist Presentations**

**Invited Session: BOM Junior Scholar Paper Competition Finalist Presentations**
**Chair(s): Kyle Hyndman**

**Saturday, 04:00 PM - 05:30 PM, Columbia 9**
**Track: Behavioral Operations Management**

**329**

- **093-2463 Strategically Giving Service: The Effect of Real-Time Information on Service Efficiency**
  - Nil Karacaoglu, Student, Kellogg School of Management, United States
  - Antonio Moreno, Associate Professor, Harvard University, United States
  - Can Ozkan, Student, Northwestern University, United States

  We study the impact of the increased availability of real-time information on the behavior of strategic agents and the implications of this phenomenon for service efficiency using data from one of the leading e-hailing taxi platforms in South America.

- **093-2464 Believing in Analytics: Managers’ Adherence to Price Recommendations from a DSS**
  - Felipe Caro, Professor, UCLA Anderson School of Management, United States
  - Anna Saez De Tejada Cuenca, Student, UCLA Anderson School of Management, United States

  We analyze the drivers of adherence to a DSS's price recommendations using data from a fast fashion retailer. We study two interventions aimed to increase adherence, as well as the cognitive biases driving adherence. Our results provide insights on how to design better DSSs to entice practitioners to use them.

- **093-0779 Mitigating the Negative Effects of Customer Anxiety through Access to Human Contact**
  - Michelle Shell, Student, Harvard University, United States
  - Ryan Buell, Associate Professor, Harvard Business School, United States

  Through a series of lab and field experiments, conducted in the high-anxiety domain of financial services, we document the negative effects of anxiety on customer performance and demonstrate how providing customers with access to human contact can improve customers’ willingness to engage, elevate choice satisfaction, and engender trust in companies.

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**Empirical and experimental research in NPD and innovation**

**Invited Session: Empirical and experimental research in NPD and innovation**
**Chair(s): Evgeny Kagan**

**Saturday, 04:00 PM - 05:30 PM, Columbia 10**
**Track: Product Innovation and Technology Management**

- **093-0231 Search Under Constraints**
  - Sezer Ulku, Associate Professor, Georgetown University, United States

Slack resources are required for innovation to explore the many unknowns. It is also suggested that "necessity is the mother of invention", and that constraints result in superior innovation performance. Through a series of experiments, we examine how constraints influence search strategies and the performance achieved in problem solving tasks.

- **093-0857 Set Asides for Small Businesses in the Public Sector R&D Contracts**
  - Dwaiyapayn Roy, Student, University of Minnesota, United States
  - Anant Mishra, Associate Professor, Carlson School of Management, United States
  - Kingshuk Sinha, Professor, University of Minnesota, United States

This paper investigates the performance outcomes of R&D contracts that have been awarded preferentially to small businesses by the US Federal Government. Specifically, we examine how the contract pricing type and contractor experience influences the relationship between the Set Asides status of a contract and its performance outcome.

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**Platform Diversification in the Presence of Quality Uncertainty**

- **093-0931 Platform Diversification in the Presence of Quality Uncertainty**
  - Kyungmin (Brad) Lee, Student, Questrom School of Business, United States
  - Nitin Joglekar, Associate Professor, Questrom School of Business, United States

A platform can grow by diversifying products/services on its existing network. We set up a model for platform diversification with quality uncertainty, and posit increasing the quality threshold decreases market share, but increases cross-subsidies. We evaluate the finding in the context of UBER Eats service.

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**Help or Hindrance? The Role of Familiarity in Collaborative Product Development**

- **093-1039 Help or Hindrance? The Role of Familiarity in Collaborative Product Development**
  - Karthik Ramachandran, Associate Professor, Georgia Institute of Technology, United States
  - Necati Tereyagoglu, Assistant Professor, Georgia Institute of Technology, United States
  - Murat Unal, Student, Cornell University, United States

We empirically study product development in the video game industry by coupling a granular database of development credits with sales data. We find that familiarity in the team is associated with a decrease in the product's performance and this is primarily driven by the negative effect of familiarity among designers.

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**Data-driven Inventory Management**

**Contributed Session: Data-driven Inventory Management**
**Chair(s): Bhawna Priya**

**Saturday, 04:00 PM - 05:30 PM, Columbia 11**
**Track: Inventory Management**
### Optimization in Service Systems

**Chair(s):** Debdatta Sinha Roy

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<td>Production Planning with Multiple Production Lines: Forward Algorithm and Insights on Volume Flexibility</td>
<td>Suresh Chand, Professor, Purdue University, United States and Sunantha Teyarachakul Prime, Associate Professor, California State University at Fresno, United States and Suresh Sethi, Professor, University of Texas Dallas, United States</td>
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<td>Yungang Yu, Professor, University of Science and Technology of China, China and Yong-Pin Zhou, Professor, University of Washington, United States and Yifei Luo, Student, University of Science and Technology of China, China</td>
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<td>Data-Driven Optimization and Statistical Modeling to Improve Meter Reading for Utility Companies</td>
<td>Debdatta Sinha Roy, Student, University of Maryland, United States and Christof Delfyn, Assistant Professor, Maastricht University, Netherlands and Bruce Golden, Professor, University of Maryland, United States and Edward Wasil, Professor, American University, United States</td>
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### Service Operations

**Track: Service Operations**

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<td>Contributed Session: Optimization in Service Systems</td>
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<td>093-0548</td>
<td>Study on Opening Models for Video Site: When Should a Firm Charge for Online Content?</td>
<td>Shengshuo Xu, Student, Ustc, China</td>
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### Purchasing and Supplier Management

**Track: Purchasing and Supplier Management**

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<td>Friday, 04:00 PM - 05:30 PM, Monroe</td>
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<td></td>
<td>Invited Session: Panel: CAPS Showcase 2</td>
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**Saturday, 04:00 PM - 05:30 PM**

093-0387  **Optimal Learning Algorithms for Stochastic Inventory Systems with Fixed Cost**

We study the regret minimization in single-item inventory control problem with demand censoring. The ordering cost includes a fixed setup cost. We find a data-driven (s,S) inventory policy with a performance guarantee by combining zeroth-order optimization (bandit control) and first-order optimization (stochastic gradient descent) techniques.

093-2163  **Production Planning with Multiple Production Lines: Forward Algorithm and Insights on Volume Flexibility**

We consider the cost-minimization production planning problem of a shop with multiple parallel production lines each with a limited daily capacity. The shop adjusts the number of lines it operates to meet the dynamic demands. This paper provides an efficient dynamic-programming algorithm and managerial insights on management of volume flexibility.

093-2065  **Data-Driven Inventory Management: The Impact of Information Acquisition**

This paper studies an innovative inventory and promotion policy that manufacturers may obtain advanced demand information of a perishable product from a mobile app with heterogeneous consumers. Using data, including online scanning demand and suppliers’ order, we investigate the optimal policy depends on the cost of inventory and consumer segments.

093-2450  **Limited clearance sale inventory model with financial constraint**

A dyadic supply chain with financially constrained retailer is analyzed. The retailer employs limited clearance sale strategy for leftover inventory. Retailer earns higher profit if market demand is less than optimal order quantity. Buyback and revenue sharing contracts enable the supplier to coordinate the supply chain under full information setting.

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**Chair(s):** Debdatta Sinha Roy

093-0548  **Study on Opening Models for Video Site: When Should a Firm Charge for Online Content?**

A monopolistic video site provides two open models for viewers: payment and free. Video sites need to determine optimal price, advertising time, and free video definition. We find that when only a free model is open, video sites should provide high definition video to attract more viewers.

093-1567  **Capacity Reservation of Nursing Homes in Elder-Care Management**

We consider a periodic review capacity allocation problem for the nursing homes that face general random demands. The objective is to minimize the service costs over a finite planning horizon by rationing capacity in each period. We derive the optimal allocation policy based on the decomposition of the value function.

093-2348  **Operational Perils and Benefits of Free Trials in Large Scale Service Systems**

We consider the pricing and joint pricing and capacity sizing problem of a large scale service firm catering to price, delay sensitive customers, and that has the option of offering free trials. We provide approximately optimal solutions, which we then use to assess the effect of offering free trials.

093-0636  **Data-Driven Optimization and Statistical Modeling to Improve Meter Reading for Utility Companies**

Utility companies collect usage data from meters on a regular basis using RFID. In practice, there is uncertainty while reading meters from the planned routes of the vehicles leading to missed reads. We use optimization and statistics to address the uncertainty and validate our results with simulations using real data.
In this session, another group of researchers will present their recent projects, so the audience will get an overview of the type of leading-edge issues Fortune-500 companies grapple with.

**Invited Session:** Workshop: Endogeneity in Operations Management

**Chair(s):** David Ding

**334** Saturday, 04:00 PM - 05:30 PM, Lincoln East

**Track:** Empirical Research in Operations Management

Endogeneity in Operations Management

David Ding, Assistant Professor, Rutgers Business School, United States

There is still a gap for empirical researchers to understand how to address endogeneity rigorously. The workshop will get together several empirical researchers to share their experience and approaches for handling endogeneity.

**335** Saturday, 04:00 PM - 05:30 PM, Lincoln West

**Track:** Empirical Research in Operations Management

Contributed Session: Project Management

**Chair(s):** yin jinmei

**A Framework of Achieving Agility Within Construction Project Management**

Roula Michaelides, Reader, Manchester Metropolitan University, United Kingdom

Zenon Michaelides, Reader, Manchester Metropolitan University, United Kingdom

David Bryde, Professor, ????, United Kingdom

Martin Rost, Associate Professor, University of Stuttgart, Germany

Within organizations, agility denotes the ability to anticipate, respond, adjust to disruptions/changes. Within construction this ability manifests in the capacity to develop capabilities across entire construction-supply-networks prior to event-responding. This study adopts a phenomenological case-approach presenting an agility integrating framework for construction projects focusing on organizational systems and practices.

**Operational Lifecycles of Manufacturing Firms**

Nihar Kumthekar, Student, Georgia Southern University, United States

Alan Mackelprang, Associate Professor, Georgia Southern University, United States

This study investigates the presence of operational performance patterns (e.g. life-cycles) in manufacturing firms. Utilizing a secondary data set, we find evidence that market dominant and bankrupt firms exhibit differing operational life-cycle patterns.

**Are Unannounced Inspections Really Unannounced? An Empirical Examination**

Sehwon Kang, Student, University of Minnesota, United States

In this study, we investigate whether unannounced inspections could be accurately estimated using predictive analytics and how the predictability influences inspection outcome.

**Antecedents of Motor Insurance Claims: Empirical Evidence from Indian Insurance Industry**

Milind Padalkar, Professor, BENNETT UNIVERSITY, India

Motor insurance business generally faces customer churn, high agent commissions, high claim ratios, and low profitability. Using multiple regression analysis of data of Indian firms, I show superior customer service and agent quality as it correlates to building good risk portfolio characterized by lower claim ratios and higher profitability.

**Does It Pay to Align a Firm’s Competitive Strategy with its Industry IT Strategic Role?**

yin jinmei, Student, university of science and technology of china, China

shaobo wei, Associate Professor, university of science and technology of china, China

Based on the data of Chinese publicly listed firms during 2009-2015, this study theorizes and empirically tests how the firm’s competitive strategy aligns with its industry IT strategic role to improve firm performance. The empirical results present a more nuanced understanding between firm competitive strategy and industry IT strategic role.
093-1203  Robust Salesforce Contracts with Inventory Considerations
Xiangyin Kong, Student, City University of Hong Kong, China
Yimin Yu, Associate Professor, City University of Hong Kong, Hong Kong
We consider the salesforce compensation in the presence of inventory consideration and model uncertainty. Under our setting, the sales are limited by the inventory level and the lost sales are unobservable. The firm has ambiguity over the underlying distribution of the effort-contingent demand.

093-1224  Trade Credit in a Dual-Channel Supply Chain
Jayan Xu, Assistant Professor, Sun Yat-Sen University, China
We build a dual-channel supply chain to investigate the impacts of trade credit on the vertical and horizontal supply chain interactions. When two retailers have unbalanced financial statuses, we find that the supplier may bail-out the financially distressed retailer and that the predation between retailers exhibits a bidirectional pattern.

093-1256  Policy Uncertainty Disrupted Supply Chains
Jing Wu, Assistant Professor, City University of Hong Kong, Hong Kong
Kekun Wu, Assistant Professor, Zhongnan University of Economics and Law, China
Yanzhi Li, Associate Professor, City University of Hong Kong, Hong Kong
Using a sample of U.S. firms and their international suppliers and customers, we study the impact of American and foreign economic policy uncertainty on the choice for firms to adjust their supply chain. We find that higher domestic economic policy uncertainty leads firms to shift production abroad (suppliers).

093-1240  Methods and Tools in Operations Management - Experience from Inverted-Classroom-Teaching
Stefan Treitl, Senior Lecturer, ????, Austria
Lena Silbermayr, Assistant Professor, Vienna Univ of Econ & Business Admin, Austria
Martin Waitz, Post Doc/Researcher, University of Economics and Business, Austria
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<td>Carl Zunker, Kalyn Howard, Seong-Jong Joo</td>
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**Saturday, 04:00 PM - 05:30 PM**

Our application-focused undergraduate class "Methods and Tools in Operations Management" is designed in a way that allows the comparison of traditional lectures and Inverted-Classrooms, where students prepare the content themselves before the actual contact sessions. We compare the students' performance in the different didactic settings and present the results.

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### Session 340

**Invited Session:** Emerging Topics in Sustainable Operations  
**Chair(s):** Shouqiang Wang

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### Session 341

**Invited Session:** Data-Driven Methods and Applications  
**Chair(s):** Yini Gao

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Most supply networks are characterized by ?rns that source from multiple suppliers and suppliers that serve multiple ?rns, thus resulting in suppliers who deliver in their degree centrality, i.e., the number of ?rns they supply to. We explore how supplier centrality affects socially-supply chains and offer novel and useful insights.

We consider supply chains where the buyer cannot identify which supplier is at fault when quality defect occurs (e.g., agri-food). We study the impact of Blockchain-enabled traceability on supply chain quality contracts, in both parallel supply chains and serial supply chains, and derive insights into the value of traceability.

In this work, we utilize statistical and machine learning methods to help the Environmental Protection Agency with facility selection for emission inspections.

Societal orientation forms the backbone of sustainability orientation in firms. This study indicates that societal orientation plays a significant moderating role on the relationship between sustainable product design, byproduct design, and innovations. The statistical inference is drawn from a panel survey of 207 US manufacturing firms across several industries.

We study an online assortment optimization problem where a seller aims to maximize the total revenue, despite the uncertainty and the heterogeneity in the customers' personalized Multinomial Logit choice models. We propose a Thompson sampling policy, which is probably near-optimal and performs well empirically.

We integrate machine learning with distributionally robust optimization to address a two-period problem for the joint pricing and production of multiple items. We investigate the problem by proposing a K-means adaptive markdown policy and an affine recourse approximation; the latter allows us to reformulate the problem into an MILP.

Trucking transportation costs consist of pre-negotiated linehaul base costs plus variable costs. This is an exploratory observational study of full truckload linehaul shipments using simple linear regression. We develop a model for more accurately predicting the variable costs, thus providing industry with precise total shipment cost information.
We propose to integrate V2G into the new energy vehicle grid, and propose a multi-objective planning model that considers the user's utility. It is proved by experiments that this kind of operation model has achieved the goals we proposed earlier.