### Sessions for Friday, May 03

#### Friday, 08:00 AM - 09:30 AM

**Contributed Session: Practices of Green IT**

**Chair(s):** Davis Alves

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<tr>
<th>Session ID</th>
<th>Title</th>
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<tr>
<td>093-1916</td>
<td>65 Practices of Green IT: Acceptance at a Brazilian Information Security Company</td>
<td>Davis Alves, Professor, Universidade Paulista - Unip, Brazil; Anderson Barbosa, Green IT Enthusiastic, Universidade Nove De Julho, Brazil; Aline Caldeira, Green IT Enthusiastic, Faculdade de Informatica e Administracao, Brazil; Marcelo Romero, Green IT Enthusiastic, Universidade Sao Francisco, Brazil; Paula Coelho, Green IT Enthusiastic, Universidade Paulista - UNIP, Brazil</td>
<td>A survey has identified 65 Green IT Practices (Alves, 2016), however, the acceptance of these practices by companies of different segments is questioned. Through a questionnaire aimed at IT professionals, this research aims to verify which of the 65 Green IT practices are acceptable by a Brazilian information security company.</td>
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<td>093-2260</td>
<td>Operational Green IT Implementations for Risk Management: Green Governance for Carbon Disclosure</td>
<td>Xue Ning, Student, University of Colorado Denver, United States; Jiban Khuntia, Assistant Professor, University of Colorado Denver, United States; Terence Saldanha, Assistant Professor, Washington State University Pullman, United States; Nigel Melville, Associate Professor, University of Michigan, United States</td>
<td>This study examines how operational green IT implementations for carbon monitoring and standards-based verification process mitigate the firm-level risk perception for climate change for better carbon disclosure. Matched data for more than 100 firms support a relevant model and hypotheses. Implications for green governance using IT is discussed.</td>
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<td>093-1940</td>
<td>65 Practices of Green IT: Acceptance in a Brazilian Company of IT Outsourcing</td>
<td>Davis Alves, Professor, Universidade Paulista - Unip, Brazil; Marcelo Romero, Green IT Enthusiastic, Universidade Sao Francisco, Brazil; Aline Caldeira, Green IT Enthusiastic, Faculdade de Informatica e Administracao, Brazil; William Lima, Green IT Enthusiastic, Universidade Paulista - UNIP, Brazil; Leandro Moreira, Green IT Enthusiastic, Fundacao Getulio Vargas, Brazil</td>
<td>A questionnaire was made in 65 IT Practices (Alves, 2016), however, it questions the culture of company practices by different assumptions. Through the selection of IT professionals, this research aims to verify which IT practices are acceptable to a multinational IT outsourcing company.</td>
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**Contributed Session: Agri-Supply Chain Management**

**Chair(s):** Marcelo Sá

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<td>093-0045</td>
<td>Food Supply Chain Management: The Role of Sustainable Dyadic Relationships</td>
<td>Luai Jraisat, Senior Lecturer, University of Northampton.ac.uk, United Kingdom</td>
<td>The paper aims to explore high-order themes concerning sustainable-dyadic-relationships (SDRs) involving information sharing along food supply chains. Five multiple-case studies of SDRs are conducted to examine the topic of fresh fruit and vegetable supply chains. The findings support the development of a new conceptual framework and provide implications for management.</td>
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<td>093-0158</td>
<td>Risk, Resilience, and Sustainability in Supply Chain Networks: A Case Study of the Food Industry</td>
<td>Kudzai Chiwenga, Student, University of Bradford, United Kingdom</td>
<td>Research’s main purpose is to investigate how firms within a supply chain network collaborating in relation to mitigating risk and vulnerability can attain resilience and sustainability. The research concentrates mainly on how collaboration between the focal firm and actors within its supply chain network can enhance sustainability and resilience.</td>
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<td>093-0327</td>
<td>Agribusiness 4.0: Proposing a Model for the Supply Chain of Soybeans</td>
<td>Anderson Amorin, Student, Faculdade Meridional IMED, Brazil; Camille Backes, Student, Faculdade Meridional IMED, Brazil; Guilherme Vargas, Assistant Professor, Faculdade Meridional IMED, Brazil; Henrique Machado, Student, ???, Brazil</td>
<td>A model for the supply chain of soybeans is proposed, taking into account the sustainability and resilience aspects.</td>
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We study how Industry 4.0 can affect the supply chain of soybeans. For this, a systematic review was carried out on characteristics of the Industry 4.0 and technologies applied to the soybean supply chain. Subsequently, a conceptual model of a supply chain of soybean 4.0 was elaborated and validated. This research aimed to understand the role of supply chain collaboration during a slow onset disruption. A qualitative research was carried out through multiple case studies in two Brazilian agri-food supply chain. The main findings indicate the type of relationship between horizontal and vertical collaboration with others resilience elements.

Friday, 08:00 AM - 09:30 AM

093-2056  The Role of Collaboration for Agri-Food Supply Chains Water Resilience
Marcelo Sá, Professor, Universidade Nove de Julho, Brazil
Susana Pereira, Professor, Fundacao Getulio Vargas, Brazil
Priscila Miguel, Professor, Fundacao Getulio Vargas, Brazil

This research aimed to understand the role of supply chain collaboration during a slow onset disruption. A qualitative research was carried out through multiple case studies in two Brazilian agri-food supply chain. The main findings indicate the type of relationship between horizontal and vertical collaboration with others resilience elements.

Ettore Settanni, Post Doc/Researcher, Institute for Manufacturing, Department of Engineering, United Kingdom
Jagit Singh Srai, Reader, University of Cambridge, United Kingdom

Analytics are developed to unravel structural interdependencies for selected agri-food value networks in the Indian regional economy and the wider world economy. Scenarios are formulated to evaluate the impact of a transition away from highly specialized wheat-paddy cropping patterns on local water resources and water embodiment in international trade.

093-1456  Farming Logistics Operations Enabled by Intelligent Autonomous Vehicles for High-value Sustainable Crops
Naoum Tsolakis, Post Doc/Researcher, Cambridge University, United Kingdom
Jagit Singh Srai, Reader, University of Cambridge, United Kingdom

This research aims to investigate the use of intelligent autonomous vehicles in farming logistics operations for the optimized use of resources and increased operational efficiency in agri-fields, applicable to the case of high-value crops in India. To that end, navigation patterns are identified and a vehicle routing algorithm is designed.

093-0376  Sustainable Built Environment and Academic Performance
Anita Lee-Post, Associate Professor, University of Kentucky, United States
Chon-Huat Goh, Associate Professor, Rutgers University, United States

To what extent does a sustainably built environment contribute to academic success? In addressing this question, we propose and validate a model that captures the relationship between the design of a sustainably built environment and academic support. Implications for sustainable operations in an academic context will be discussed.

093-0121  Blockchain in Food Distribution for Public Goods
Dan Bumblauskas, Associate Professor, University of Northern Iowa, United States
Brett Dugan, Co-Founder, Bytable Foods, United States
Jacy Rittmer, Co-Founder, Bytable Foods, United States

How can blockchain more accurately and transparently move goods through supply chains? Learn about initiatives being developed on the front line of blockchain with a case study from Bytable Foods - a midwestern USA startup company utilizing blockchain technology in tracking food. Specific examples include egg and cattle distribution.

Friday, 08:00 AM - 09:30 AM

093-0032  Supply Chain Digital Twin for Managing Resilience and Disruption Risks
Dmitry Ivanov, Professor, Berlin School of Economics and Law, Germany

In this paper we present methodological principles and a generalized design of a digital supply chain twin. For example, a decision-support system that integrates optimization, simulation, and data analytics for pro-active resilient supply chain design and reactive real-time disruption risk management.

093-0825  Importance of Environmental, Learning, and Technology Orientations for Preparedness and Alertness in Tourism SCs
Sanatan Mandal, Associate Professor, Amrita Vishwa Vidyapeetham, India

We explore the role of environmental, technology, and learning orientations in the development of tourism SC preparedness and alertness. Responses from 122 hotel and tour managers were analyzed using SmartPLS 2.0.M3. Results showed orientations to enhance preparedness and alertness resulting in enhanced sustainable tourism SC performance.

093-1613  Retailer Financing vs Crowdfunding: Impacts of Exclusive Channels and Influencer Marketing
Zhixin Chen, Student, School of Management, China
Jie Wu, Professor, School of Management, China
Xiang Ji, Post Doc/Researcher, School of Management, China

Since more and more online retailers open their own crowdfunding platforms, there emerges one issue which is whether a retailer should finance a capital constraint supplier or induce it to do crowdfunding. We show that a retailer can have more incentives to finance a regular supplier than an exclusive supplier.
Friday, 08:00 AM - 09:30 AM

Invited Session: Manufacturing Systems Optimization

Chair(s): Qipeng Zheng

093-1912 A Decomposition-Based Approach for Analyzing Network of Polling Queues
Ravi Suman, Student, University of Wisconsin-Madison, United States
Ananth Krishnamurthy, Professor, University of Wisconsin-madison, United States

We develop a decomposition-based approach to analyze tandem polling queues under different strategies, namely the independent, synchronous polling, and out-of-sync strategies. Under Markovian assumptions for arrival and service times, we estimate queue lengths and waiting times, compare the performance under different manufacturing settings, and provide managerial insights.

093-1971 Dynamic Decisions on Processing Rates in Make-to-Order Production Systems
Raik Stolletz, Professor, University of Mannheim, Germany
Jannik Vogel, Student, University of Mannheim, Germany

The digitalization in supply chains allows for detailed forecasts of upcoming changes in demands. We assume flexible production rates and associated costs to it. Optimal changes in processing rates are investigated in a stochastic setting. We present a time-dependent queueing model which is integrated in an optimization approach.

093-2351 Stochastic Network Flow Models for Photolithography (LITHO) Process
Qipeng Zheng, Assistant Professor, University of Central Florida, United States
Mengnan Chen, Student, University of Central Florida, United States

In a semiconductor wafer fab, there are multiple product types that have different due dates and different process flows. Since Photolithography (LITHO) process can be considered as the bottleneck step of each photo layer in wafer production, we propose stochastic network flow models to optimize the schedule.

Invited Session: Procurement in Global Economy

Chair(s): Shouqiang Wang

093-0055 Better to Bend than to Break: Sharing Supply Risk Using the Supply-Flexibility Contract
Mehdi Hosseinabadi Farahani, Student, University of Texas Dallas, United States
Milind Dawande, Professor, University of Texas Dallas, United States
Haresh Gurnani, Professor, Wake Forest University, United States
Ganesh Janakiraman, Professor, University of Texas Dallas, United States
Shouqiang Wang, Assistant Professor, University of Texas Dallas, United States

We analyze a contract in which a supplier, who is exposed to disruption risk, offers a supply-flexibility contract comprising of a wholesale price and a "flexibility fraction" to a buyer facing random demand. We show that profits for both players increase by the introduction of flexibility into the contract.

093-0091 Procurement with Cost and Non-Cost Attributes: Cost Sharing Mechanisms
Shivam Gupta, Assistant Professor, University of Nebraska Lincoln, United States
Milind Dawande, Professor, University of Texas Dallas, United States
Ganesh Janakiraman, Professor, University of Texas Dallas, United States
Shouqiang Wang, Assistant Professor, University of Texas Dallas, United States

We propose a cost-sharing mechanism for a buyer facing two-dimensional private information on cost and non-cost attributes. We show, both theoretically and numerically, that the best cost-sharing mechanism is near-optimal and is robust to the presence of costly, but unobservable efforts of the contractors.

093-0273 G2G Contracts for India's Pulses Procurement: Ad-Hoc Bargaining Versus Long-Term Contracts
Liyang Mu, Assistant Professor, University of Delaware, United States
Bin Hu, Associate Professor, Naveen Jindal School of Management, United States
Srinagesh Gavirneni, Professor, Cornell University, United States

India depends on pulses as a vital source of protein, yet has faced pulses crises driven by insufficient and uncertain internal yields and ad-hoc importing policies. The government is experimenting with long-term importing policies. Inspired by this practice, we examine G2G ad-hoc versus long-term contracts under the Nash-Bargaining framework.

093-0416 "Now or Later?": When to Deploy Qualification Screening in Open-Bid Auction for Re-Sourcing
Wen Zhang, Student, University of Texas Dallas, United States
Elena Katok, Professor, University of Texas Dallas, United States
George Chen, Assistant Professor, London Business School, United Kingdom
Zhiyi Wan, Associate Professor, University of Oregon, United States

We consider when qualified and multiple not-yet-qualified suppliers compete in an open-bid auction. By characterizing the dynamic structure of the suppliers' equilibrium strategies, we can calculate the buyer's expected cost under post-qualification which is computationally impossible to compute otherwise. We identify scenarios where post-qualification is mostly valuable to the buyer.
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<td>093-0474</td>
<td>Dynamic Inventory Management with Inventory-Based Financing</td>
<td>Vernon Hsu, Professor, Chinese Univ of Hong Kong, Hong Kong</td>
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<td>We consider a multi-period stochastic inventory management problem where a cash-constrained firm can obtain additional working capital through an inventory-based financing facility by pledging its inventory to obtain loans from a lender.</td>
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<td>093-1044</td>
<td>Sourcing Decisions with Financially Distressed Suppliers</td>
<td>Andreas Gernert, Student, Ebs Business School, Germany</td>
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<td>H. Sebastian Heese, Professor, North Carolina State University, United States</td>
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<td>David Wuttke, Assistant Professor, Ebs Business School, Germany</td>
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<td>In a game-theoretic model we study the impact of sourcing decisions on supplier default risk. Allowing for strategic interactions among a buyer and two competing, non-symmetric suppliers, we identify several mechanisms that explain when suppliers may even benefit from financial distress.</td>
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<td>093-2338</td>
<td>Newsvendor Model as an Exchange Option on Demand and Supply Uncertainty</td>
<td>Ran Ji, Assistant Professor, George Mason University, United States</td>
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<td>Bardia Kamrad, Professor, Georgetown University, United States</td>
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<td>Under a contingent claims framework, we develop a single period model in the context of an exchange option in a discounted NPV maximization setting in the classical newsvendor problem. Both demand and yield variables are modeled as Wiener processes. The prospect of improving average yield is also investigated.</td>
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<td>093-1090</td>
<td>The Effectiveness of Supplier Buy Back Finance</td>
<td>Weiming Zhu, Assistant Professor, I E S E, Spain</td>
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<td>Facing a budget-constrained buyer, a novel approach for large suppliers is adopting buy-back financing schemes to relieve their downstream partners and reduce channel costs. We, both theoretically and empirically, analyze the efficiency of these financing schemes and explore their impact on operational decisions and contract design.</td>
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**Blockchain and information sharing in supply chains**

**Chair(s):** Christoph Schmidt

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<td>093-1029</td>
<td>Blockchain and Supply Management</td>
<td>Dale Rogers, Professor, Arizona State University Tempe, United States</td>
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<td>Thomas Choi, Professor, Arizona State University Tempe, United States</td>
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<td>CAPS Research filed a report on blockchain and supply management in 2018. It tried to accomplish three things: define blockchain, discuss the current state of the technology, and offer use-case examples. This presentation will offer an overview of that report.</td>
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<td>093-0561</td>
<td>Exploring the Role of IP Protection in Asymmetric Buyer-Supplier Relationships</td>
<td>Alexander Fink, Student, Swiss Federal Institute of Technology Zurich, Switzerland</td>
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<td>Stephan Wagner, Professor, Swiss Federal Institute of Technology Zurich, Switzerland</td>
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<td>Our study investigates the use and impact of intellectual property (IP) protection in collaboration with established buying firms and new venture suppliers. We choose a multiple case study approach based on semi-structured interviews and contribute to the knowledge-based view by examining formal and informal knowledge sharing and transferring patterns.</td>
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<td>093-0776</td>
<td>Blockchain in Supply Chain Management - Transaction Costs and Technology Adoption</td>
<td>Christoph Schmidt, Student, Eth Zurich, Switzerland</td>
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<td>Stephan Wagner, Professor, Swiss Federal Institute of Technology Zurich, Switzerland</td>
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<td>We utilize the transaction cost theory to get an early idea of how blockchain, the most prominent form of distributed ledger technology, might influence supply chain management regarding governance decisions, opportunistic behavior, and business uncertainty. Beyond transaction costs, we explore additional factors influencing technology adoption in Additive Manufacturing.</td>
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**Additive Manufacturing**

**Chair(s):** Ali Parlakturk

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<td>093-0109</td>
<td>Product Line Design with 3D Printing: The Uniqueness-Quality Trade-Off</td>
<td>Lingxiu Dong, Professor, Washington University St Louis, United States</td>
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<td>Duo Shi, Assistant Professor, The Chinese Univ of Hong Kong, Shenzhen, China</td>
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<td>Fugiang Zhang, Professor, Washington University St Louis, United States</td>
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<td>Due to its additive manufacturing mechanism, 3D printing is able to handle some product designs impractical for traditional methods. However, it is also more difficult to obtain high product quality with 3D printing due to its technical and material limitations. This paper investigates the interplay between those two properties.</td>
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<td>093-0139</td>
<td>3D printing of Spare Parts via IP License Contracts</td>
<td>Rob Basten, Associate Professor, Eindhoven University of Technology, Netherlands</td>
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<td>Bram Westerweel, Student, Eindhoven University of Technology, Netherlands</td>
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<td>Jing-Sheng Song, Professor, Duke University Durham, United States</td>
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A manufacturer can sell spare parts to its customers directly or offer a license agreement on the parts' design so that customers use a local 3D printing service provider to supply parts. We characterize the optimal contract structure and generate insights into the degree of centralization of the supply chain.

093-0567  Decentralized Customization with 3D Printing: Drivers of Retail Level 3D Printing
Nagarajan Sethuraman, Student, University of North Carolina Chapel Hill, United States
Ali Parfakturk, Associate Professor, University of North Carolina Chapel Hill, United States
Jayashankar Swaminathan, Professor, University of North Carolina Chapel Hill, United States

In this paper, we study the trade-offs involved in decentralized customization enabled by 3D printing at retail stores. We develop an analytical model that considers in-store 3D printing as a component of the firm's broader product line strategy.

093-0084  Designing Sustainable Products Under Co-Production Technology
Yen-Ting Lin, Associate Professor, University of San Diego, United States
Haoying Sun, Assistant Professor, University of Kentucky, United States
Shouqiang Wang, Assistant Professor, University of Texas Dallas, United States

We study a firm's product line design strategy under co-production technology and green consumers. The firm makes a traditional product using high-quality material and introduces a co-product with lower-quality material. We show that the firm's pricing strategy is non-monotonic in material cost and it may strategically repel some consumers.

093-0355  Sustainable or Not? Role of Valuation Uncertainty and Operational Flexibility in Product Line Design
Lingxiu Dong, Professor, Washington University St Louis, United States
Iva Rashkova, Assistant Professor, Washington University St Louis, United States
Weiqing Zhang, Student, Washington University St Louis, United States

We consider a monopolist selling products of traditional and sustainable qualities to heterogeneous consumers. Unique features of the model are the uncertain consumer valuation and the relationship between development and production costs. We characterize the resulting company's optimal strategy and implications for consumer welfare and development waste.

093-1807  The Impact of Crop Minimum Support Price (MSP) on Crop Production and Farmer Welfare
Prashant Chintapalli, Assistant Professor, Indian Institute of Management Bangalore, India
Christopher Tang, Professor, University of California Los Angeles, United States

We examine the effectiveness of MSP in safeguarding farmers' income and ensuring sufficient production of different crops. We show that if a crop's MSP is too low it could hurt the earnings of the farmers of the crop. We discuss the procedure to find MSPs that are Pareto improving for farmers.

093-2058  Key Factors in Green Product Line Design
Monire Jalili, Assistant Professor, Cleveland State University, United States
Tolga Aydinliyim, Associate Professor, Baruch College, United States
Nagesh Murthy, Professor, University of Oregon, United States

We consider a monopolist selling base and green product versions to consumers whose differential (dis)utilities vary by consumer type and depend on the firm's quality decision (i.e., the recycled content in the green version). We analyze quality and price decisions and characterize whether/when a uniformly green product line sustains optimally.

093-1253  Global Supply Chain Networks and Tariff Rate Quotas
Anna Nagurney, Professor, University of Massachusetts Amherst, United States
Deniz Besik, Student, University of Massachusetts Amherst, United States
Ladimer Nagurney, Associate Professor, University of Hartford, United States

We develop a global supply chain network model in which profit-maximizing firms engage in competition in the presence of quantitative trade policy instruments in the form of tariff rate quotas. The modeling and computational framework utilizes variational inequality theory. A case study on global avocado trade is also presented.

093-0306  What Price, Optimality? A Location Model for Economic Development
Jaehwan Jeong, Assistant Professor, Radford University, United States
Joyendu "Joy" Bhadury, Professor, Radford University, United States

While traditional location models find "optimal" locations, we present a model suitable for application in economic development that identifies the potential costs in making any given site "optimal" for location. Borrowing approaches from inverse optimization, we model the problem and propose a solution methodology. Initial empirical results will be presented.

093-0722  Group Purchasing Mechanisms
Behzad Hezarkhani, Associate Professor, Brunel University, United Kingdom
Greys Sosic, Associate Professor, Marshall School of Business, United States
We study mechanisms to manage group purchasing. The buyers are cost-sensitive and willing to buy a range of product quantities at different prices. We introduce a mechanism with the property that some buyers’ strategic deviation from truthful bidding can only make the others better off.

Investigating the Opportunities for Optimizing Land Side Logistics Import and Export Operations in Sri Lanka
Namal Bandaranayake, Senior Lecturer, University of Peradeniya, Sri Lanka
Asela Kulatunga, Associate Professor, University of Peradeniya, Sri Lanka

This paper focuses on the handling of landside operations of Sri Lankan export and import operations done by a number of parties. Hence, many resources are underutilized. This research investigates the possibilities for optimization of overall landside logistics operations.

Effect of Inconvenience and Liquidity Constraints on the Usage of Off-Grid Solutions: Evidence From Rwanda
Bhavani Shanker Uppari, Assistant Professor, Singapore Management University, Singapore

We investigate the viability of recharge-based off-grid 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.

Demand Response in Wholesale Electricity Markets
Baris Ata, Professor, University of Chicago, United States
Asligul Serasu Duran, Assistant Professor, Haskayne School of Business, Canada
Ozge Islegen, Assistant Professor, Kellogg School of Management, United States

This project explores the impact of the participation and compensation of demand response (DR) providers in the wholesale electricity market over the long term. We model the equilibria in an electricity market under various scenarios of DR participation, and investigate the impact of different DR compensation policies.

Non-Ownership Business Models for Solar Energy
Vishal Agrawal, Associate Professor, Georgetown University, United States
Beril Toker, Professor, Georgia Institute of Technology, United States
Safak Yucel, Assistant Professor, Georgetown University, United States

In addition to the traditional sales model, solar power companies, such as SolarCity and Sunrun, have introduced innovative non-ownership business models: leasing and power purchase agreements. We study a solar power company’s business model decisions and how they affect the environment, customers, and utility firms.

Optimal Pricing and Information Disclosure Strategy for Crowdfunding of New Product Development
Jue Liu, Student, Nanjing University, China
Xiaofeng Liu, Associate Professor, Zhongnan University of Economics and Law, China
Houcai Shen, Professor, Nanjing University, China

This paper investigates the optimal information disclosure and pricing strategies for crowdfunding of new product development under quality uncertainty. Different from previous research, we find that it can be both favorable and unfavorable with information disclosure.

Resource Planning and Crashing for Project Management: A Distributionally Robust Approach
Lianmin Zhang, Assistant Professor, Nanjing University, China

We study a problem that arises in the resource planning and crashing of many projects. The exact probability distribution of the task is unknown, but it belongs to a certain family of distributions. The optimal decisions can be derived by solving a mixed-integer programming problem.

Moderating Effects of Project Characteristics on the Relationship Between ICT Usage and Collaborative Product Development
Chathurani Silva, Professor, University of Sri Jayewardenepura, Sri Lanka
Sanjay Mathrani, Professor, Massey University, New Zealand
Nihal Jayamaha, Professor, Massey University, New Zealand

Using a relational resource and organizational information theory-based model including multidimensional ICT usage and collaborative product development performance measures, this study investigated moderating effects of project complexity and uncertainty of the direct and indirect relationships between ICT usage and new product quality, commercial success, and time performance, through collaboration performance.

Dynamic Learning and Market Making in Spread Betting Markets with Informed Bettors
John Birge, Professor, University of Chicago, United States
Yifan Feng, Student, University of Chicago, United States
Bora Keskin, Assistant Professor, Duke University Durham, United States
Adam Schultz, Senior Quantitative Researcher, Wealthfront Inc., United States
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We study the profit maximization problem of a market maker in a spread betting market. Anonymous bettors with heterogeneous strategic behavior and information levels participate in the market. The non-omnipotent market maker strives to extract information from the market while guarding against the strategic manipulation of an informed bettor.

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093-0900 Operational Execution and POP Display Effectiveness: Evidence from the Adoption of an IoT Technology
Yannis Stamatioupolos, Assistant Professor, The University of Texas at Austin, United States
Ashish Agarwal, Associate Professor, The University of Texas at Austin, United States
Jacob Zeng, Student, The University of Texas at Austin, United States
This study uses the adoption of an innovative IoT technology by a brick-and-mortar retail chain in the United States to evaluate the operational execution of promotional inventory campaigns and its impact on the effectiveness of those campaigns.

093-1615 Generating Marketing Outcome Through Internet of Things (IoT)
Beenish Tariq, Assistant Professor, National University of Science & Technology Pakistan, Pakistan
Sadaf Taymou, Lecturer, National University of Science & Technology Pakistan, Pakistan
This paper highlights the effectiveness of data stored from operational use of IoT for generating marketing related outcomes: business intelligence for product development, product support, and customer relationship management. Furthermore, it explains how IoT can provide support to improve communication ties between product manufacturer and product support through target markets.

093-2027 Uncovering Offline Conversion Funnel with Internet-of-Things: The Case of WiFi Tracking in Retail Industry
Xing Lan, Student, University of Texas Austin, United States
Jun Duan, Associate Professor, University of Texas Austin, United States
Tianshu Sun, Assistant Professor, University of Southern California, United States
Our study showcases the value of IoT technology in offline business applications. By leveraging a comprehensive dataset that combines IoT data on consumer traffic, we find a significant “visit effect” towards the increase in sales. We also demonstrate marked improvements in profits by designing customized marketing strategies using IoT.

093-0688 Artificial Intelligence and Big Data Analytics to Tackle Urban Mobility Issues
Shalique Sidikh, Student, Indian Institute of Management Kozhikode, India
Rajeev A, Student, IIMK, India
Sandep Sivakumar, Student, IIMK, India
Rahul Ramachandran, Student, IIMK, India
The study proposes an Artificial Intelligence based framework as a solution to improve the driving habits of citizens as well as reduce the burden of traffic abiding citizens by incentivising them through various measures. The framework is grounded on big data analytics to cluster people based on driving habits.

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093-0481 Improving Operating Room Scheduling: The Value of Using Data to Deal with Variable Surgeries
Rodrigo Carrasco, Assistant Professor, Universidad Adolfo Ibáñez, Chile
Macarena Azar, Student, Universidad Adolfo Ibáñez, Chile
Surgery variability has been one of the critical difficulties in operating room scheduling. In this work we tackle the issue by using historical data to develop chance constraints for our scheduling model. Our approach allows accounting for surgery variability, improving schedule performance.

093-0641 Managing Appointment Booking Under Customer Choices
Nan Liu, Assistant Professor, Boston College, United States
Peter Van De Ven, Scientific Staff Member, Centrum Wiskunde & Informatica (CWI), Netherlands
Bo Zhang, Research Staff Member, IBM Research, United States
Motivated by the increasing use of online appointment booking platforms, we study how to offer appointment slots to customers in order to maximize the total number of slots booked. We develop two models, non-sequential offering and sequential offering, to capture different types of interactions between customers and the scheduling system.

093-0925 Legal Assignments and Fast EADAM with Consent via Classical Theory of Stable Matchings
Xuan Zhang, Student, Columbia University, United States
Legal assignments and EADAM algorithm extend stable assignments in the school-choice problems. We prove that legal assignments are stable assignments in a sub-instance and give an O(E) algorithm to obtain this sub-instance, thus also giving an O(E) implementation of the EADAM algorithm.

093-0348 Combinatorial Scheduling for Adaptive ML in Cyber-Security
Ojas Parekh, Principal Member of Technical Staff, Sandia National Labs, United States
Cynthia Phillips, Senior Scientist, Sandia National Labs, United States
Vladlena Powers, Student, Columbia University, United States
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<th>Track: Operational Excellence</th>
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<td><strong>Invited Session: Operational Excellence in Pharma</strong></td>
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<td><strong>Chair(s):</strong> Thomas Friedli, Steffen Eich</td>
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<td><strong>093-0472 Perspectives, Opportunities, and Limitations of Operational Excellence in Pharma</strong></td>
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<tr>
<td>Andre Mendes de Carvalho, Student, University of Minho, Portugal, United States</td>
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<td>Paulo Sampaio, Associate Professor, University of Minho, Portugal</td>
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<td>Eric Rebentisch, Lecturer, Massachusetts Institute of Technology, United States</td>
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<td>Pharma organizations face increasing pressure to optimize processes and become agile. Although having much to gain from such efforts, challenges arise: a highly regulated environment, different conceptions of quality, and a cultural mindset of rigor that, beyond R&amp;D, has little room for experimentation. A review on perspectives, opportunities, and limitations.</td>
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| **093-1204 The Role of Culture in Operational Excellence** |
| Nuala Calnan, Post Doc/Researcher, Dublin Institute of Technology, Ireland |
| Thomas Friedli, Professor, Institute of Technology Management, Switzerland |
| Findings indicate that the best potential to sustainably impact patient-relevant outcomes lie in the integration of three critical areas of influence for the pharmaceutical industry: operational excellence, knowledge excellence, and cultural excellence. The Excellence Framework combines the cultural excellence of a learning organization with excellence in knowledge creation and utilization. |

| **093-0214 Linking Operational KPIs and Regulatory Quality Compliance Outcomes** |
| Steffen Eich, Student, Institute of Technology Management, Switzerland |
| Thomas Friedli, Professor, University Of St. Gallen, Switzerland |
| Interventions from regulatory authorities are a proven measure for evaluating quality performance and quality risk in pharmaceutical manufacturing. Previous research analyzed FDA inspection outcomes regarding location or company type. We present a first approach to link the data with operational KPIs from the manufacturing sites. |

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<th>Track: Product Innovation and Technology Management</th>
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<td><strong>Contributed Session: Innovation and Information Technology</strong></td>
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<td><strong>Chair(s):</strong> Allan O'Connor</td>
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<td><strong>093-0865 The Impact of Union Density on Technology Investment</strong></td>
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<tr>
<td>David Zhang, Assistant Professor, Lehigh University, United States</td>
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<td>Douglas Mahony, Associate Professor, Lehigh University, United States</td>
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<td>The Management and Economics literatures have produced mixed results when examining the effect of union density on innovation and IT investments. In addressing these mixed findings, this study extends this stream of research and explores the relationship between union density and IT investment at the industry level.</td>
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| **093-2318 Managing Product Pipelines During Technology Advancements** |
| Hossein Jahandideh, Data Scientist, Google, United States |
| Data-center and cloud computing technology is constantly advancing. When a new generation of hardware is being introduced, the supply of the old generation needs to be cut in advance (due to its lead-time). This talk focuses on the trade-offs that are considered in finding the optimal cut-off point. |

| **093-0973 The Difficult Choice of SMES for Green Innovation: Government vs Firms? An Operations' Digitization Perspective** |
| Yuqing Lin, Student, Nanyang Technological University, Singapore |
| Mariana Giovanna Andrade Rojas, Assistant Professor, Nanyang Technological University, Singapore |
| This paper presents a bipartite network model to examine the effects of government and firm-firm collaboration on SMEs green innovation. Results show that government-firm bipartite centrality has a greater effect on green innovation than firm-firm centrality does. Moreover, operations digitization decreases the positive effect of government centrality on green innovation. |

| **093-2154 Ecosystems in Industry Platforms and Entrepreneurial Contexts: Competing or Synchronised Agendas?** |
| Allan O'Connor, Associate Professor, University of South Australia, Australia |
| Rowena Vnuk, Student, University of South Australia, Australia |
Ecosystems comprise dynamic sets of interactions. While some suggest an ecosystem embodies the interactions and interdependencies within industry platforms others are emphasizing the enabling of entrepreneurial action. This presentation will examine the linkages between ecosystems in the industry platform and entrepreneurial contexts and the implications for learning regions.

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

**Invited Session: Behavioral Analytics for Operating Rooms Management**

**Chair(s): Vikram Tiwari**

**093-0205** Understanding Standardization in Hospital Settings  
Kejia Hu, Assistant Professor, Vanderbilt University, United States  
Vikram Tiwari, Associate Professor, Vanderbilt University Medical Center, United States  
In this research, we want to understand how standardization exists in hospital operations and the impacts it leads to in hospital performance.

**093-0809** Organizational and Behavioral Determinants of Surgical Theater Scheduling  
Soo-Hoon Lee, Associate Professor, Old Dominion University, United States  
Phillip Phan, Professor, Johns Hopkins University, United States  
Tinglong Dai, Associate Professor, Johns Hopkins University, United States  
Nehama Moran, RN, Johns Hopkins Hospital, United States  
Jerry Stonemetz, Clinical Associate, Johns Hopkins Hospital, United States  
We aim to uncover organizational and behavioral drivers underlying operating room over- and under-scheduling. By analyzing a large dataset from Johns Hopkins Medicine comprising of patient and clinician demographics, surgical procedures, operational, and team structure, we find that team composition influences scheduling deviations and have implications for patient outcomes.

**093-1857** Reducing Perioperative Phases of Care Durations Through Improved Efficiency  
Seyed Amin Seyed Haeri, Student, Clemson University, United States  
Jaeyoung Kim, Student, Clemson University, United States  
Lawrence Fredendall, Professor, Clemson University, United States  
Yann Ferrand, Assistant Professor, Clemson University, United States  
Kevin Taffe, Associate Professor, Clemson University, United States  
Dee San, Associate Professor, Medical University Of South Carolina, United States  
This study used a patient-level dataset with over 32,000 surgical cases where timestamps recorded specific start and end times of key activities. Time durations of each step within the pre-operative, intra-operative, and post-operative phases are analyzed to identify patterns to improve perioperative efficiency, and reduce phases of care durations.

**093-0054** Allocation of Operating Room Block Capacity Among Surgeons Using Data Envelopment Analysis  
Vikram Tiwari, Associate Professor, Vanderbilt University Medical Center, United States  
Warren Sandberg, Professor, Vanderbilt University Medical Center, United States  
We developed a Data Envelopment Analysis based method to objectively assist surgical service chiefs in reallocating operating rooms’ (OR) capacity among surgeons. The technique compares an individual’s performance relative to their peers with respect to how efficiently the individual converts a set of allocated-capacity based inputs into OR utilization-based outputs.

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**21 Thursday, 08:00 AM - 09:30 AM, Columbia 5**  
**Invited Session: E-Commerce**  
**Chair(s): Guang Li**

**093-0140** Online Assortment Optimization When Consumers Refine Their Search  
Zhichao Feng, Student, University of Texas Dallas, United States  
Shengqi Ye, Assistant Professor, University of Texas Dallas, United States  
Dorothy Honhon, Associate Professor, University of Texas Dallas, United States  
When the consumer is not familiar with the product category, the online retailer's assortment may trigger interest in a specific product feature, leading the consumer to refine their search, and focus only on products with this feature. Taking this into consideration, this paper studies the online retailer's optimal assortment decision.

**093-1530** Value of Promotions with Delayed Incentives: An Empirical Investigation of Gift Card Promotions  
Bharadwaj Kadyala, Assistant Professor, Hong Kong University of Science and Technology, Hong Kong  
Ozalp Ozer, Professor, University of Texas Dallas, United States  
Serdar Simsek, Assistant Professor, University of Texas Dallas, United States  
Gift cards have become a popular vehicle for promotional campaigns run by many departmental, consumer electronic, and online retail stores. Using a proprietary data set from a large department store, we investigate how customers respond to these promotions as well as its effectiveness as a promotional vehicle for retailers.

**093-2265** Money-Back Guarantees When Physical and Online Retailers Compete  
Hang Ren, Assistant Professor, George Mason University, United States  
Tingliang Huang, Associate Professor, Boston College, United States  
Christopher Tang, Professor, University of California Los Angeles, United States  
Ying-Ju Chen, Associate Professor, Hong Kong University of Science and Technology, Hong Kong
Friday, 08:00 AM - 09:30 AM

We study pricing and product return policies when physical and online stores compete. We find that the online store offers money-back guarantees when its salvage advantage outweighs total return hassle. Interestingly, better quality may hurt the online store. Moreover, showroming may benefit the physical store and harm the online store.

093-2225  Designing Shipping Policies for E-Tailers: The Role of Topping-Up Behavior to Qualify for Free Shipping
Guang Li, Assistant Professor, Queen’s University, Canada
Lifei Sheng, Assistant Professor, University of Houston Clear Lake, United States
Dongyuan Zhan, Assistant Professor, University College London, United Kingdom

We study the optimal contingent free shipping (CFS) policy for online retailers in integrated marketing and operational planning. Under this policy, customers enjoy free shipping if their total purchase amount in a single order exceeds certain pre-determined threshold; otherwise, they pay a flat shipping fee.

22  Friday, 08:00 AM - 09:30 AM, Columbia 6  Track: Healthcare Operations Management
Contributed Session: Improving service quality and patient experience I
Chair(s): Vishal Ahuja

093-1089  Measuring Hospital Process Service Quality Under the Background of Mobile Internet
Min Zhang, Professor, Tianjin University, China
Ran Wang, Student, Tianjin University, China
Jingjing Xiong, Associate Professor, Wenzhou Medical University, China

Mobile technology has greatly changed patients’ perceived quality. Based on literature review, focus groups, and two field surveys, this paper conceptualized, constructed, refined and tested a multiple-item scale containing three dimensions (environment quality, human-human quality, and human-technology quality), which reflected key aspects of hospital process service quality in mobile context.

093-0332  Improving Performance Metrics in Physician Offices - Field Project Experiences
Sanjay Ahire, Professor, University of South Carolina, United States

In this paper, we describe our experiences from field projects to improve patient cycle time, satisfaction, and clinical outcomes in physician offices across a hospital network. We will discuss the role of patient characteristics, processes, staff culture, and physician involvement in determining performance outcomes.

093-0955  A Healthcare Quality Management Event Study: Outcome of Using the Baldrige Excellence Framework
Heng (John) Xie, Student, University of North Texas, United States
Xianghui (Richard) Peng, Assistant Professor, Penn State University Erie, United States
Victor Prybutok, Professor, University of North Texas, United States

This study examines the benefits associated using a Baldrige Award structure. We use an event study methodology to analyze patient satisfaction data in the HCAHPS database. The results show that effective quality management practices as measured by a Baldrige Award application improve hospital performance as measured by patient satisfaction.

093-0957  Healthcare Quality Management Practice and Theory: Comparing Findings from the Literature with Industry Practice
Heng (John) Xie, Student, University of North Texas, United States
Xianghui (Richard) Peng, Assistant Professor, Penn State University Erie, United States
Victor Prybutok, Professor, University of North Texas, United States

This study employs meta-analysis and text mining to investigate the relationship of quality management practice and operations in the healthcare industry. We compare the findings from the literature to healthcare industry practice. The results show that moderating factors exist between the relationship of performance and quality management practices.

093-1289  Maintaining Continuity in Service: An Empirical Examination of Primary Care Physicians
Vishal Ahuja, Assistant Professor, Southern Methodist University, United States
Carlos Alvarez, Associate Professor, Texas Tech University, United States
Bradley Staats, Professor, University of North Carolina Chapel Hill, United States

In service operations where customers have repeated interactions with service providers, it is critical to understand the importance of maintaining continuity of service, whether customer-types with complex needs need to be prioritized and can there be too much continuity. We study these questions in the context of healthcare.

23  Friday, 08:00 AM - 09:30 AM, Columbia 7  Track: Supply Chain Management
Invited Session: Platform systems and gig economy
Chair(s): Edward Anderson Kaitlin Daniels

Xiaohan Ding, Student, School of Management, China
Nan Liu, Professor, Zhejiang University, China

This paper explores a new role of B2B platform as a third party coordinator in logistics operations for online transaction. We propose analytical models to derive the platform’s impact on other players (i.e., the users, 3PLs) under different circumstances. Some useful managerial insights are further provided based on numerical analyses.

093-2395  Pricing, Quality and Competition at On-Demand Healthcare Service Platforms
Yixuan Liu, Student, University of Texas Austin, United States
Xiaofang Wang, Associate Professor, Renmin University of China, China
Friday, 08:00 AM - 09:30 AM

Stephen Gilbert, Professor, McCombs School of Business, United States
Guoming Lai, Associate Professor, University of Texas Austin, United States

We consider on-demand healthcare platforms that allow patients to seek care online from distributed doctors. We develop a strategic queueing model and find that in equilibrium a higher commission rate always lowers doctor participation and service quality, but it may increase the service price if it significantly softens the competition.

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093-2404 Surge Pricing Under Spatial Spillover: Evidence From Uber’s Operations
Nitin Joglekar, Associate Professor, Questrom School of Business, United States
Kyoungmin (Brad) Lee, Student, Questrom School of Business, United States
Marcus Bellamy, Assistant Professor, Boston University, United States

We investigate how a platform accounts for surge-pricing by estimating a spatial panel model. We find that Uber’s pricing policies involve both capacity spillover and price spillover across adjacent zones. We then conduct counterfactual analyses to provide insights for managing congestion, while accounting for consumer and labor welfare.

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093-1295 Dynamic Performance of Platform Systems Under Delayed Investment Effects
Edward Anderson, Professor, University of Texas Austin, United States

We build a system dynamics computer simulation model of a two-sided platform system which permits an analysis of platform performance under investment for numerous sequential periods. We look at several investment levers with delayed effects, such as price setting, investment in integration tools, etc.

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Chair(s): Wenqiang Xiao  Xinyi Zhao

093-0590 Negotiation in Competitive Supply Chains: The Kalai-Smorodinsky Bargaining Solution
Qi Feng, Professor, Purdue University, United States
Yuanchen Li, Student, Purdue University, United States
George Shanthikumar, Professor, Purdue University, United States

We study bargaining in a two-tier supply chain with supply/retail competition. Compared to the previous studies in which the Nash bargaining solution is widely applied, we adopt an alternative solution, the Kalai-Smorodinsky bargaining solution, in competing supply chains, and establish its connection to the Nash bargaining solution.

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093-0640 Value of Insurance in a Capital-Constrained Supply Chain
Wenli Wang, Associate Professor, Taiyuan University of Science & Technology, China
Gangshu Cai, Associate Professor, Santa Clara University, United States

We consider a supply chain consisting of one supplier and a capital-constrained retailer in need of short-term financing from a competitive bank. We find a Pareto Zone where the supplier will encourage the retailer to buy insurance and the supply chain can be partially coordinated.

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093-2116 Trade Credit and Long-Term Investment
Leon Chu, Associate Professor, USC, United States
S. Alex Yang, Associate Professor, London Business School, United Kingdom

Trade credit is an important form of external financing and an integrated part in supply chain contracts. We propose a normal theory of trade credit based on how it modifies the two contracting parties’ bargaining position and thus stimulate more efficient long-term investment.

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093-0786 Operational Signaling with Financial Constraint and Market Competition
Xinyi Zhao, Student, New York University, United States
Guoming Lai, Associate Professor, University of Texas Austin, United States
Wenqiang Xiao, Associate Professor, New York University, United States

This paper studies a firm’s financing and information decision amidst market competition under information asymmetry. We characterize the firm’s optimal strategy by formulating a multiple-receiver signaling game model. The equilibrium structure is based on the firm’s internal capital level and the competition intensity.

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Chair(s): John Aloysius

093-1698 Impact of Metric-Alignment on Supply Chain Performance: A Behavioral Experiment Study
Arunachalam Narayanan, Assistant Professor, University of Houston, United States
Rafay Ishaq, Associate Professor, Auburn University, United States

This paper evaluates the impact of aligning performance metrics across different supply chain echelons on managerial decision-making that can improve supply chain performance. In a behavioral experiment study, supply chain decisions made by 556 participants are evaluated to study the interaction effect of metric-alignment and information sharing on SC performance.

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093-1756 When Models Meet Managers: Integrating Statistical Model-Based and Judgmental Forecasting
John Aloysius, Professor, University of Arkansas, United States
Enno Siemsen, Professor, University of Wisconsin, United States
Rebekah Brau, Student, University of Arkansas, United States
Big data analytics and machine learning increasingly features in forecasting practice. However, practitioners continue to use judgment to incorporate private information to improve the accuracy of statistical model forecasts. Our research examines how statistical models and human judgment may be integrated to improve forecast accuracy in different forecasting environments.

093-1845 Collocation: The Secret to Supply Chain Collaboration
Siqi Ma, Assistant Professor, University of Akron, United States
John Aloysius, Professor, University of Arkansas, United States
Li Hao, Assistant Professor, University of Arkansas, United States

Collocation is known to be advantageous in supply chain relationships. The literature has documented operational reasons for why collocation is beneficial. Our research however looks beyond the purely operational benefits and examines whether there are behavioral reasons why collocation may be beneficial.

093-092 Project Selection and Success: Insights from the Drug Development Process
Panos Markou, Post Doc/Researcher, Cambridge University, United Kingdom
Stylianos Kavadias, Professor, Cambridge University, United Kingdom
Nektarios Oraiopoulos, Assistant Professor, Cambridge University, United Kingdom

Selecting the right R&D projects is challenging because of the uncertainty and complexity surrounding those selection decisions. We examine how operational factors (technological uncertainty, competitive development projects, and the presence of project transaction costs) drive the selection decision, and we provide evidence on how these factors meaningfully contribute to productivity.

093-1363 Parallel Innovation Contests
Erkin Korpeoglu, Assistant Professor, University College London, United Kingdom
C. Gizem Korpeoglu, Assistant Professor, University College London, United Kingdom
Iha Hafalir, Professor, University of Technology Sydney, Australia

We study innovation contests where multiple organizers seek solutions from agents and the quality of an agent's solution depends on her effort and uncertainty. We find that when uncertainty is sufficiently large, organizers benefit from agents' entry to multiple contests and organizer profit is unimodal in the number of contests.

093-1477 The Effect of Flexibility in Delegating Innovation
Morvarid Rahmani, Assistant Professor, Georgia Institute of Technology, United States
Karthik Ramachandran, Associate Professor, Georgia Institute of Technology, United States

Clients often engage external providers to generate innovative solutions for their problems. Providers can improve solution quality by increasing the intensity of their efforts, while clients decide when to stop the project. We explore how the client's flexibility in stopping influences the progress and efficiency of the delegated innovation project.

093-0970 Dual-Index Policies for Serial Systems with Dual Delivery Modes and Batch Orders
Wu Jie, Professor, University of Science and Technology of China, China
Qiang Wang, Student, University of Science and Technology of China, China
Chao Yang, Associate Professor, Shanghai University of Finance and Economics, China
Yi Yang, Associate Professor, Zhejiang University, China

We study the dual sourcing problem from a supply chain's perspective and use analytics comparing the performance of two different policies. We show analytically that the obtained results are different from the known results of optimizing a single-stage inventory system and define conditions under which each policy is optimal.

093-1037 Managing a Hybrid RDC-DC Inventory System
Xiaoyue Yan, Student, Cornell University, United States
We study a hybrid RDC-DC serial inventory system. We propose two simple and easy-to-implement heuristic policies for the system. The first heuristic policy combines the characteristics of the echelon-base-stock policy and the dual-index policy. We then develop another heuristic policy based on the three-index policy and multimodularity of the problem.

28  Contributed Session: Aviation & Consumer Review Systems
Chair(s): Liqiang Huang

093-2028  Is Quality an Entry Barrier? The Case of the Airline Industry
Amirhossein Alamdar Yazdi, Assistant Professor, Adelphi University, United States
Adams Steven, Assistant Professor, University of Maryland, United States

It has been found that incumbent airlines change their on-time performance when faced with new entry in their market albeit with mix findings. We investigate if improving on-time performance inhibits and/or prolongs actual entry. Our findings provide managerially relevant contributions to the literature in quality as competitive tools.

093-2024  Non-Price Reactions to Price Competition
Amirhossein Alamdar Yazdi, Assistant Professor, Adelphi University, United States
Adams Steven, Assistant Professor, University of Maryland, United States
Mohammad Ali Alamdar Yazdi, Assistant Professor, Johns Hopkins University, United States

We conduct a simultaneous analysis of the effects of threat of entry/exit of Southwest Airlines on incumbent carriers' on-time performance as well as yield. The results show that the effects depend highly on the general, long run on-time performance and pricing policy of incumbent carriers.

29  Invited Session: Analytical Approaches to Humanitarian Operations
Chair(s): Nezih Altay

093-0173  The Impact of Donors’ Behavior as Incentive Providers on Aid Agencies’ Operational Decisions
Fumoni Toyasaki, Associate Professor, York University, Canada
Emel Arikan, Assistant Professor, Vienna Univ of Econ & Business Admin, Austria
Lena Silbermayr, Assistant Professor, Vienna Univ of Econ & Business Admin, Austria

Introducing the concept of leader-follower game into a stylized two-stage stochastic model. Our research examines the interaction between an aid agency’s procurement timing and its financing under demand uncertainty in the presence of uncertain budget constraints.

093-0821  Collaborative Prepositioning Network Design for Regional Disaster Response
Burcu Balci, Associate Professor, Ozyegin University, Turkey
Selene Silvestri, Post Doc/Researcher, Hec Montreal, Canada
Marie-Eve Rancourt, Associate Professor, Hec Montreal, Canada
Gilbert Laporte, Professor, Hec Montreal, Canada

We present a collaborative prepositioning strategy for the Caribbean to strengthen regional response capacity. We propose an insurance-based method for sharing the prepositioning costs among the partner countries. We show that a significant reduction in total inventory can be achieved by applying collaborative prepositioning as opposed to a decentralized policy.

093-1018  Optimal Control of Parallel Queues for Managing Volunteer Convergence
Gabriel Zayas-Caban, Assistant Professor, University of Wisconsin-Madison, United States
Emmett Lodree, Associate Professor, University of Alabama Tuscaloosa, United States
David Kaufman, Assistant Professor, University of Michigan-Dearborn, United States

Volunteer convergence refers to the influx of volunteers into affected areas after large-scale disasters. Unlike most labor assignment problems in operations management, volunteer convergence is characterized by random arrival and abandonment of workers. We introduce a Markov decision process model that optimizes admission and assignment decisions in this context.

30  Contributed Session: Collaboration in Humanitarian Operations
Chair(s): Renata Anderson

093-0643  Development and Use of Social Capital in Disaster Relief: From Dormant to Active Stage
Iana Shaheen, Student, University of South Florida, United States
Arash Azadegan, Associate Professor, Rutgers University, United States
Collaborative relationships in humanitarian supply chains are important. In this study, we explore how these relationships lead to social capital. We analyze responses from 55 managers to explore how collaborative relationships are viewed, strengthened, and applied by different types of organizations responding to disasters.

093-0861 Who Takes the Lead? How Power and Status Holders Impact the Information Exchange in Humanitarian Clusters
Lea Rüsch, Student, Kuehne Logistics University, Germany
Maria Besiou, Professor, Kuehne Logistics University, Germany
Niels Van Quaquebeke, Professor, Kuehne Logistics University, Germany

In our study, we intend to investigate barriers and facilitators of successful information sharing in the humanitarian field. Thereby, we particularly focus on the information flows between organizations in humanitarian cluster meetings, which stand for the objective of successful coordination, and the role leadership plays in this context.

093-1630 Decentralized Policies for Time Allocation in Family Planning Outreach
Lisanne van Rijn, Student, Erasmus University Rotterdam, Netherlands
Harwin De Vries, Lecturer, INSEAD, France
Luk Van Wassenhove, Professor, INSEAD, France

Decentralized decision-making processes are often preferred in development organizations, but the corresponding lack of coordination may lead to suboptimal outcomes. The extent of this has not yet been quantified. We investigate (de)centralized time allocation policies for family planning outreach teams in Uganda and show that decentralized policies perform near optimal.

093-1951 Critical Moment: Closure and Handover in Humanitarian Projects
Renata Anderson, Lecturer, Northern Kentucky University Highland Heights, United States

The research seeks to understand the challenges and strategies of collaboration used by humanitarians during the closure and the handover of the projects. A qualitative study was performed with people with experience in coordinate humanitarian projects. Evidence shows that this is a critical moment for the nature of the collaboration.

093-0363 The Value of Rapid Delivery in Omnichannel Retailing
Marshall Fisher, Professor, The Wharton School, University of Pennsylvania, United States
Santiago Gallino, Assistant Professor, The Wharton School, United States
Xu Joseph (Jiaqi), Assistant Professor, Carnegie Mellon University, United States

We study the effect of faster deliveries in omnichannel retail using the opening of a distribution center as a quasi-experiment. Using difference-in-differences approach, we show sales increase in both online and offline channels. We examine the evolution of the effect and interactions with existing brand presence and customer experience.

093-1064 Pick-up, Delivery, or Both? An Online Grocer’s Optimal Fulfillment Models
Chloe Glaeser, Assistant Professor, Kenan-Flagler Business School, United States
Xuanming Su, Professor, University of Pennsylvania, United States
Ken Moon, Assistant Professor, The Wharton School, United States

We partner with an online grocery retailer to answer the practice-based question of the optimal mix of delivery zones and fulfillment models using data-driven analytics. Based on empirical evidence, we build and estimate a structural model and perform a counter-factual analysis to estimate the revenue increase from additionally offering delivery.

093-1664 Impact of Downsizing Stores on Supplier Performance
Vidya Mani, Assistant Professor, Penn State University University Park, United States
Doug Thomas, Professor, University of Virginia, United States

We use longitudinal transaction data on retail stores that were downsized to one-fifth of the store size to evaluate the impact of downsizing decisions on supplier performance. We find that reduction in supplier spend reduces the supplier service level while reduction in variability improves supplier performance.

093-1555 Bifurcating Order Fulfillment Channels in E-Commerce
Hyun Seok (Huck) Lee, Assistant Professor, Oregon State University, United States
Yusoon Kim, Associate Professor, Oregon State University, United States
Junbo Son, Assistant Professor, University of Delaware, United States

Large e-commerce marketplaces increasingly bring order fulfillment function in-house, resulting in the two internally competing order fulfillment channels – conventional fulfillment by merchant (FBM) and emergent fulfillment by platform (FBP). Using transactions and logistics data in the e-commerce setting, we compare the two channels through uncovering distinctive underlying mechanisms.

093-1707 Optimal Order Policy for Capital-Constrained Supplier with Online SCF: From a Data-Driven Optimization Perspective
Nina Yan, Professor, Central University of Finance And Economics, China
Zhineng Chen, Student, Central University of Finance And Economics, China
Friday, 08:00 AM - 09:30 AM

Using data-driven newsvendor model, we examine the optimal ordering strategy for capital-constrained supplier of e-marketplace with online supply chain finance. Through analytical and numerical analysis, we compare the performance of our proposed approach to others, and explore the interaction between operational and financing decisions based on data.

093-1601 Who Should Finance the Supply Chain? Impacts of Demand Disruption and Information Asymmetry
Jie Wu, Professor, University of Science and Technology of China, China
ying zha, Student, University of Science and Technology of China, China
Duo Shi, Assistant Professor, The Chinese Univ of Hong Kong, Shenzhen, China
Xiang Ji, Student, University of Science and Technology of China, China

We study the financial decisions of a supply chain under demand disruption and information asymmetry. We show that the retailer can have more incentives to borrow money from the manufacturer rather than from the bank when facing disruption. This effect can be enlarged by increasing of information asymmetry.

093-2090 Risk Sharing Contracts in Supply Chains: A Dynamic Equilibrium Perspective
Shivani Shukla, Assistant Professor, University of San Francisco, United States
Jose Cruz, Associate Professor, University of Connecticut, United States

In this paper, we develop a framework for a dynamic equilibrium in risk sharing contracts between profit-maximizing manufacturers and retailers that face idiosyncratic income uncertainty. We analyze the impact of strategic sharing on supply chain disruption risks and costs and we evaluate the supply chain performance of risk.

093-1409 A Trade Credit Supply Chain From a Financial Perspective With ROI-Maximize
Panos Kouvelis, Professor, Washington University St Louis, United States
Yunze Qiu, Student, Washington University St Louis, United States

Instead of maximizing the expected cash flow, we model a trade-credit supply chain when a capital-constrained newsvendor-style retailer maximizes financial efficiency metrics, i.e., ROI. We find that although the ROI-maximizer has a more conservative ordering strategy, the supply chain's efficiency is improved since the supplier decreases the wholesale price.

093-0597 Client Selection for a Risk-Sensitive Commodity Options Underwriter with Poisson Demand
Belleh Fontem, Assistant Professor, University of Mary Washington, United States
Megan Price, Student, United States

We consider a worst-case client selection problem for a risk-sensitive underwriter of an option contract on a commodity with geometric Brownian motion spot price trajectories. We propose heuristics for the resulting non-linear binary integer programming problem and report experimental results on multiple instances.

093-2071 Inventory Management for Supply Chains Facing Uncertain Input Price and Demand of a New Product
Shi Chen, Assistant Professor, University of Washington, United States
Junfei Lei, , ,
Kamran Moinzadeh, Professor, University of Washington, United States

This paper considers a supplier-buyer relationship in the presence of uncertain input price and demand. Under two common types of procurement contracts - the fixed wholesale price and the guaranteed supplier margin contracts, we derive the supplier's optimal stocking decisions as well as the buyer's optimal purchase time and quantity decisions.

093-2445 Impact of Online and Blended Education in SCM
Eva Ponce-Cueto, Associate Professor, Massachusetts Institute of Technology, United States
Josue Velazquez-Martinez, Assistant Professor, Massachusetts Institute of Technology, United States

The impact of online/blended education in SCM will be discussed in this session. We will compare traditional Master's Degree with Blended Master's Degree in SCM. We will share the experience and lessons learned implementing the MITx MicroMasters and Blended Master's Program in SCM at MIT.

093-1383 How Does Flexibility Affect Environmental Performance? Empirical Evidence From the Electricity Generation Industry
David Drake, Assistant Professor, University of Colorado Boulder, United States
Suresh Muthulingam, Assistant Professor, Penn State University University Park, United States

We examine how flexibility affects greenhouse gas emissions in the electricity generation industry. Our results show that flexibility has a significant impact on the environmental performance of power generating units in the industry.
Does Environmental Performance Predict Quality Risk at Pharmaceutical Plants?

Christian Blanco, Assistant Professor, Ohio State University, United States
John Gray, Associate Professor, Ohio State University, United States

In Joon Noh, Student, Ohio State University, United States

We merge pharmaceutical plant-level outcomes related to environmental performance (from the Environmental Protection Agency [EPA]) and quality (from the Food and Drug Administration [FDA]). We explore whether, when, and how these two dimensions of performance are related.

Donations for the Refugee Crisis: Cash versus In-Kind Assistance

Telesilla Kotsi, Student, Kelley School of Business, United States
Owen Wu, Associate Professor, Indiana University, United States
Alfonso Pedraza-Martinez, Associate Professor, Indiana University, United States

Motivated by the Greek response to the 2017 refugee crisis, we analyze trade-offs between cash and in-kind assistance. Cash assistance allows for spending flexibility and supports local economy, but is complicated by the presence of market power. We examine the impact of market structures on allocation decision of humanitarian organizations.

Kicking Ash: Who (or What) Is Winning the War on Coal?

David Drake, Assistant Professor, University of Colorado Boulder, United States
Jeff York, Assistant Professor, University of Colorado Boulder, United States

Power generators throughout the U.S. have recently shed coal capacity at an unprecedented rate. Multiple stakeholders have claimed credit - gas executives, policy makers, renewables advocates, and environmental NGOs. Through a survival analysis, we explore the extent to which each has impacted the expected life of coal-fired power generating units.

Strategic Investment in Shared Suppliers with Quality Deterioration

Youngsoo Kim, Assistant Professor, University of Alabama Tuscaloosa, United States
Dharma Kwon, Assistant Professor, University of Illinois Urbana-Champaign, United States
Anupam Agrawal, Associate Professor, Texas A&M University College Station, United States

This paper studies buyer firms’ investment decisions when one firm can free-ride on the other’s investment. A major finding is that the repetitive nature of the investment induces inefficient delays in investment. We also estimate the resulting inefficiency by using primary data, concluding that coordination can achieve substantial cost savings.

Delegating Search in the Pharmaceutical Research Pipeline

Saša Zorc, Assistant Professor, Darden School of Business, United States
Ilia Tsetlin, Professor, INSEAD, Singapore
Sameer Hasija, Associate Professor, INSEAD, Singapore

We model a pharmaceutical firm seeking to conduct a search for acquisition opportunities and consider the decision of whether to outsource this search. We identify the optimal dynamic contract and show that sensitivity to quality leads to optimality of in-house search, while sensitivity to speed leads to optimality of outsourcing.

Leveraging POS and IOH Data to Detect Phantom Inventory

Sergio Caballero Caballero, Lecturer, Massachusetts Institute of Technology, United States
Francisco Jauffred, Lecturer, Massachusetts Institute of Technology, United States

This paper leverages daily point-of-sales data and inventory on-hand data to detect phantom inventory at customers’ retail stores for a major CPG manufacturer. The methodology is implemented at a SKU-level in more than 150 stores in the US. Our approach provides timely and more accurate predictions compared to existing solutions.

Multilocation Newsvendor Problem: Centralization and Inventory Pooling

Chaolin Yang, Associate Professor, Shanghai Univ. of Finance and Economics, China
Zhenyu Hu, Assistant Professor, National University of Singapore, Singapore
Sean Zhou, Professor, Chinese Univ of Hong Kong, Hong Kong

We study a multilocation newsvendor model with a risk-averse retailer owning multiple retail stores, each of which is operated by a risk-averse manager. We distinguish the concepts of centralization and inventory pooling in this setting and show that centralization brings more value when the store managers are sufficiently risk-averse.
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<td>Closing the Loop: Modeling Environmental Production and Supply Networks</td>
<td>Sabine Baumann, Professor, Jade University, Germany</td>
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<td>093-1886</td>
<td>An Optimization Model to Design a Beverage Container Reverse Logistics Network</td>
<td>Saman Hassanazadeh Amin, Assistant Professor, Ryerson University, Canada</td>
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<td>Babak Mohamadpour Tosarkani, Student, Ryerson University, Canada</td>
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<td>Mukesh Kumar, Lecturer, University of Cambridge, United Kingdom</td>
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<td>093-2229</td>
<td>Integrated Performance Assessment for Circular: A study of Food Supply Chains</td>
<td>Denis Niedenzu, Student, Cambridge University, United Kingdom</td>
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<td>Naoum Tsolakis, Post Doc/Researcher, Cambridge University, United Kingdom</td>
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<td>Mukesh Kumar, Lecturer, University of Cambridge, United Kingdom</td>
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<td>093-0732</td>
<td>Technology Choice and Network Design for Reverse Supply Chain Under Multiple Uncertainties</td>
<td>Qiaofeng Li, Student, Tsinghua University, China</td>
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<td>Zhi-Hai Zhang, Associate Professor, Tsinghua University, China</td>
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<td>Gisela Lanza, Professor, Karlsruhe Institute of Technology, Germany</td>
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<td>The Anheuser Busch InBev Trailer Problem: An Application of Online Resource Allocation and Inventory Selection</td>
<td>Xingxing Chen, Assistant Professor, University of Richmond, United States</td>
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<td>Jacob Feldman, Assistant Professor, Washington University St Louis, United States</td>
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<td>093-1103</td>
<td>A Constant-Factor Approximation Algorithm for Network Revenue Management</td>
<td>Yuhang Ma, Student, Cornell University, United States</td>
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<td>Paat Rusmevichientong, Professor, University of Southern California, United States</td>
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<td>Mika Sumida, Student, Cornell University, United States</td>
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<td>Huseyin Topaloglu, Professor, Cornell University, United States</td>
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<td>093-1116</td>
<td>Engaging Users in an Online Marketplace: Insights From Field Experiments</td>
<td>Maxime Cohen, Assistant Professor, New York University, United States</td>
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<td>Apostolos Filippas, Assistant Professor, Stevens Institute of Technology, United States</td>
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<td>C. Daniel Guetta, Lecturer, Columbia University, United States</td>
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<td>093-1488</td>
<td>Unified Action Spaces for Online Allocation Problems</td>
<td>Jackie Baek, Student, Massachusetts Institute of Technology, United States</td>
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<td>Will Ma, Post Doc/Researcher, Google Research, United States</td>
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Battery Management of Automated Guided Vehicles: Developing a Research Agenda

Yoshinori Suzuki, Professor, Iowa State University, United States

Some research generated two be research through can system raised efficient structured performance study guided review the battery conducted of literature to was (AGVs) of

On-Demand and Low-Priority Services with Limited Capacity: Pricing Schemes for Cloud Platforms

Yong Tan, Professor, Foster School of Business, United States
Kamran Moinzadeh, Professor, University of Washington, United States
Shi Chen, Assistant Professor, Foster School of Business, United States

In recent years, some cloud providers introduced the low-priority preemptible services to attract demand for their surplus capacities. In this study, we examine three questions: Under which conditions should a provider introduce the low-priority service? How should she determine the optimal price? And how to improve the current pricing scheme?

Beneficiary Choice Modeling, Demand Estimation and Policy Design in Public Welfare Programs

Maya Ganesh, Student, Indian School of Business, India
Sarang Deo, Assistant Professor, Indian School of Business, India
Sripad Devalkar, Assistant Professor, Indian School of Business, India

We model the decision making behavior of households availing benefits under a public welfare scheme. Using large scale program data from India’s food security program, we determine the impact of availability and accessibility on households’ choice of outlets to avail their benefits from and its impact on policy design.

Increasing the Fellowship Acceptance Rate at a Non-Profit Organization in the Education Sector

Milind Sohoni, Professor, Indian School of Business, India
Sandeep Chitla, Student, Indian School of Business, India
Arun Kumar Rout, Student, UT Dallas, United States

Non-profit organizations face challenges in hiring the “right talent.” We analyze the operational challenges faced by Teach for India, an NPO working in the education sector in India. We empirically establish the causal impact of a few operational interventions and propose a data-driven optimization model to increase the yield.

How to Sell a Dataset? Pricing Policies for Data Monetization

Sameer Mehta, 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
Vijay Mookerjee, Professor, University of Texas Dallas, United States

The wide variety of pricing policies used in practice by data-sellers suggests that, as of yet, there is no common understanding on how datasets should be priced. We formulate a tractable model of a data-seller’s problem of optimally pricing a dataset, and exploit its special structure to obtain near-optimal pricing policies.

Selecting a Portfolio of Mobile Ad-Exchanges Under Supply Uncertainty

Leila Hosseini, Student, University of Texas Dallas, United States
Shaojie Tang, Assistant Professor, The University of Texas at Dallas, United States
Vijay Mookerjee, Professor, University of Texas Dallas, United States

We consider an ad-delivery firm which needs to select a set of ad-exchanges and determine its bidding strategy. By working with more than one ad-exchange, the procurement cost can be lowered. However, this lower cost needs to be balanced with the additional cloud computing costs and extra participation costs.

On-Demand and Low-Priority Services with Limited Capacity: Pricing Schemes for Cloud Platforms

Shi Chen, Assistant Professor, Foster School of Business, United States
Kamran Moinzadeh, Professor, University of Washington, United States
Yong Tan, Professor, Foster School of Business, United States

In recent years, some cloud providers introduced the low-priority preemptible services to attract demand for their surplus capacities. In this study, we examine three questions: Under which conditions should a provider introduce the low-priority service? How should she determine the optimal price? And how to improve the current pricing scheme?
Friday, 09:45 AM - 11:15 AM

093-0733  The Effect of Flow Time on Productivity and Production
Douglas Thomas, Economist, NIST, United States
Anand Kandaswamy, Economist, NIST, United States
We examine the impact that material, finished goods, and work-in-process flow time have on productivity and production measured using the multifactor productivity index and manufacturing value added. A total of 12 models are presented and four simulations are developed to examine the impact of flow time.

093-1800  Optimal Recharge Policy for Battery Electric Vehicles (BEVs)
Peng Li, Student, Rutgers Business School, United States
Chunliu Zhou, Student, Dalian University of Technology, United States
Lian Qi, Associate Professor, Rutgers University, United States
We propose a novel policy to address some issues as follows 1) How to optimize operations and reduce the high inventory cost of batteries; 2) How many batteries should be stocked based on (s, S) policy; and 3) How many swapping and rechargers facilities will be completed at each station.

45  Friday, 09:45 AM - 11:15 AM, Holmead East  Track:  Global Supply Chain Management
Invited Session: Impact of Emerging Technologies on Supply Chain
Chair(s): Yue Zhang

093-0393  Capacity Expansion with a Bundled Supply of Capacity Attributes: An Application to Cloud Computing
Mohammad Arbabian, Student, University of Washington, United States
Shi Chen, Assistant Professor, University of Washington, United States
Kamran Moinzadeh, Professor, University of Washington, United States
We study the well-known problem of expanding capacity of server attributes in a cloud company where supply of attributes is bundled. We consider a cost minimization problem in a continuous review, finite, horizon setting. Furthermore, the best server configurations to be deployed each cycle are studied.

093-0807  Information Issues on On-Demand Platforms
Puping Jiang, Student, Washington University St Louis, United States
Ridesharing platforms commonly offer drivers payment that depends on demand condition and bonus that is contingent on the number of rides completed. In this paper, we explain the existence of bonuses in the context of competing platforms and the corresponding information issues.

093-0832  Optimal Battery Purchasing and Charging Strategy at Electric Vehicle Battery Swap Stations
Bo Sun, Student, HKUST, Hong Kong
Xu Sun, Student, Columbia University, United States
Ward Whitt, Professor, Columbia University, United States
We introduce a dynamic fluid model to describe charging operations at an EV battery swap station facing non-stationary demands for battery swap and non-stationary prices for recharging batteries, with the objective of finding an optimal battery purchasing and charging policy that best trades off battery investment cost and operating cost.

093-0094  Stock or Print? Impact of 3D Printing on Spare Parts Logistics
Jing-Sheng Song, Professor, Duke University Durham, United States
Yue Zhang, Assistant Professor, Penn State University University Park, United States
We present a general framework to study the design of spare parts logistics in the presence of 3D printing technology. We consider multiple parts facing stochastic demands, and adopt procure/manufacture-to-stock versus print-on-demand to highlight the main difference of production modes featured in traditional manufacturing and 3D printing.

46  Friday, 09:45 AM - 11:15 AM, Holmead West  Track:  Finance and Operations Management
Invited Session: Supply Chain Finance II
Chair(s): Rong Li

093-0066  Sustainability Building of an Agricultural Supply Chain with the Capital-Constrained Farmer in Developing Economies
Zelong Yi, Assistant Professor, Shenzhen University, China
Yulan Wang, Associate Professor, Hong Kong Polytechnic Univ, Hong Kong
Ying-Ju Chen, Associate Professor, Hong Kong University of Science and Technology, Hong Kong
We consider an agricultural supply chain consisting of a capital-constrained farmer and an intermediary platform. The smallholder farmer sells products through the intermediary platform, but lacks financial resources for production. We examine the best financing format for the smallholder farmer, the platform, and the sustainability of the whole supply chain.

093-0147  Credit Risk Propagation Along Supply Chains: Evidence from the CDS Market
Senay Agca, Associate Professor, George Washington University, United States
Volodymyr Babich, Associate Professor, Georgetown University, United States
John Birge, Professor, University of Chicago, United States
Jing Wu, Assistant Professor, City University of Hong Kong, Hong Kong
We find that credit risk propagates through multiple supply chain tiers for both positive and negative credit shocks. Risk propagation is magnified with longer-term supply-chain relations, trade credit, sales contribution, differentiated products, and customer leverage, and it is moderated when a customer is investment grade or has more inventory.
A Supply Chain Theory of Factoring and Reverse Factoring
Panos Kouvelis, Professor, Washington University St Louis, United States
Fasheng Xu, Student, Washington University St Louis, United States

We develop a supply chain theory of factoring (recourse and non-recourse) and reverse factoring showing when these post-shipment financing schemes should be adopted and who really benefits from the adoption.

How Do Strategic Factors Affect Earnings Based On Textual Analysis of Annual Report?
Yuan Song, Student, Tongji University, China
Hongwei Wang, Professor, Tongji University, China
Shouyi Wang, Assistant Professor, University of Texas Arlington, United States

This paper studies the association between earnings and strategic factors based on textual analysis of annual reports. We calculate the word frequency of 20 strategic categories in Chinese annual reports from 2001 to 2017. For different markets and industries, the factors affecting earnings are different.

The Influence of a Firm’s Supply Network on its Innovation Capability: Innovation Depth and Breadth
Shubhobrata Pailt, Student, Georgia Tech, United States
Soumen Ghosh, Professor, Georgia Institute of Technology, United States
Marcus Bellamy, Assistant Professor, Boston University, United States

We examine how the innovation breadth and depth of a firm’s suppliers drive its innovation as well as the moderating effects of network structure and absorptive capacity. Using the patent and supply chain relationship data, we find empirical support suggesting both main and moderating effects on a firm’s innovation capability.

Value Slippage and Interdependence in Buyer-Supplier Relationships
Stephan Wagner, Professor, Swiss Federal Institute of Technology Zurich, Switzerland
Dennis Schuler, Post Doc/Researcher, Swiss Federal Institute of Technology Zurich, Switzerland

This study concerns value creation and value sharing in buyer-supplier relationships. It studies and develops a novel conceptual model of the relationship between supplier innovation and financial performance. In this context, value slippage and interdependence is considered. Dyadic panel data is used to test the model.

Buyer-Supplier Structural Equivalence and Supplier Innovation Value: Evidence from the PACE Awards
Sangho Chae, Assistant Professor, Tilburg University, Netherlands
Yang Yang, Assistant Professor, University of Texas at El Paso, United States
Tingting Yan, Associate Professor, Wayne State University, United States

Adopting a social capital perspective, we examine how the structural dimension of social capital affects a supplier’s innovation value to an OEM. Specifically, we consider how OEM-supplier structural equivalence impacts a dyad-level innovation outcome and supplier innovation value under different levels of relational and cognitive capital.

Smart Contracts in the Insurance Sector
Alpen Sheth, Chief product officer, Etherisc, United States
Hemang Subramanian, Assistant Professor, Florida International University, United States

Smart contracts improve overall welfare in transactions that have huge costs. However, smart contracts are not well understood in the context of multi-sided markets. In this paper, using data and methods from an insurance platform, etherisc, we model and derive equilibrium conditions of efficiencies for smart contracts.

Blockchain-Based Supply Chain Financing: An Obligatory Right Transferring Reverse Factoring Model
Mihalis Giannakis, Professor, Audencia Business School, France

We develop a blockchain-based obligatory right transferring reverse factoring model for a 3-tier supply chain. We show how the use of blockchains can improve supply chain financing and mitigate the financial bullwhip effect by reducing the cash to cash cycle and the cost rate of information transparency.
Blockchain technology holds out the promise of revolutionizing supply chain operations, for example, by speeding up inventory replenishment and receivables collection as well as reducing monitoring and transaction costs. This paper presents a model that quantifies the financial impacts of the aforesaid speed-ups in the context of cash conversion systems.

Blockchain has been widely embraced as a disruptive technology for inventory management. This study examines the Newsvendor model for a blockchain system. It aims to shed light on how blockchain adoption impacts the optimal inventory decisions, illustrated with some selected demand types, such as Uniform and Normal distributions.

Inspired by a real-world example of a paper-sugar symbiotic complex, we study the impact of competition on a firm's willingness to implement an industrial symbiotic system. We characterize the firm's optimal/equilibrium decisions for its two products - both in the presence and absence of a symbiotic system.

We construct a demand model to describe how rationally inattentive consumers make consumption decisions in response to their ambient environment for a given price and how firms take advantage of it to optimize their profit. Subsequently, we investigate implication of monopolistic firm's pricing decision on social welfare and system reliability.

This paper presents a model that quantifies the financial impacts of the aforesaid speed-ups in the context of cash conversion systems.

We show how a firm's desire to maximize its capital market valuation and to limit competitive entry can interactively affect the firm's operational decisions and long-term profits when the firm has private information about its market demand. We show a certain level of short-termism can benefit a firm's long-term profits.

Firms categorize suppliers based on performance, credit agencies classify customers according to their risks; graduate programs decide which applicants to accept. We develop an interactive Bayesian method that aids a decision maker with such a multicriteria sorting problem by learning about their preferences and exploiting that knowledge.
Friday, 09:45 AM - 11:15 AM

This project studies the interactions between a technology supplier who introduces a new technology that has unknown profitability and downstream manufacturers, who adopts the new technology into their products. The model takes account of the information spillover effect of the manufacturers’ adoption.

093-1770  Competitive Investment with Bayesian Learning: Choice of Business Size and Timing

Nur Sunar, Assistant Professor, Kenan-Flagler Business School, United States
Siyun Yu, Analyst, Cox Automotive, United States
Vidyadhar Kulkarni, Professor, University of North Carolina Chapel Hill, United States

Our study is motivated by challenges in launching a new business idea or entering an unknown market. Our paper shows that an increase in the probability of a favorable investment (compared to an unfavorable one) can continuously decrease a leader’s expected discounted profit and investment size in equilibrium.

093-0989  Resilience and Causes of Food Waste: A Case Study of Retail Store Operations

Camila Moraes, Student, Federal University of São Carlos, Brazil
Flávio Costa, Student, Federal University of São Carlos, Brazil
Andrea Silva, Professor, Federal University of São Carlos, Brazil
Ivete Delai, Associate Professor, Federal University of São Carlos, Brazil
Carla Pereira, Associate Professor, State University of Santa Catarina, Brazil

The paper identifies how resilience reduces food waste causes in retail through a case study in a Brazilian retail store. Flexibility, communication, visibility, collaboration, and supply chain design reduce seasonality, short shelf life, lack of commitment, and transport equipment failures. We conclude that resilience can indeed mitigate food waste in retail.

093-0291  How Your and Your Customer’s Pro-Environmental Practices May Affect Your Sales

Chien-Ming Chen, Associate Professor, Nanyang Technological University, Singapore
Dixon Ho, Assistant Professor, University of Technology Sydney, Singapore

Using data from US manufacturers, we find that a manufacturer with improved PEPs obtains higher sales only from customers with a high level of PEPs. We also find that sales are higher when the manufacturer’s PEP level is not higher than its customers’ PEP level.

093-1774  Predicting Carbon Abatement Outcomes Using Text Analysis

Christian Blanco, Assistant Professor, Ohio State University, United States

Firms may choose not to disclose financial information on carbon abatement opportunities for various reasons. We will explore some of the reasons why firms may not disclose financial information on carbon abatement activities using over 40,000 carbon abatement opportunities reported to CDP from 2011-2016.

093-1869  Distribution Strategies for Reducing Food-Wastage in Schools

Debjit Roy, Associate Professor, Indian Institute of Management Ahmedabad, India
Elena Belavina, Assistant Professor, Cornell University, United States
Karan Girotra, Professor, Cornell University, United States
Nathan Kallus, Assistant Professor, Cornell University, United States

Mid-day meal schemes are popular government subsidized schemes run in developing economies which incentivizes children to attend school. We develop a simulation model using realistic vehicle travel paths to test alternate distribution strategies for meeting the demand for meals in schools.

093-0210  Revenue Management and Pricing Under New Choice Models

Ruxian Wang, Associate Professor, Johns Hopkins University, United States

We characterize the structure of optimal solutions to various revenue management and pricing under new choice models.

093-0431  Commission Contracts in On-Demand Matching

Ming Hu, Professor, University of Toronto, Canada
Yun Zhou, Assistant Professor, Mcmaster University, Canada

We consider an on-demand matching platform’s decision on price, wage, and commission in different market conditions. With the objective of maximizing expected revenue, we provide a worst-case performance bound of the fixed-rate commission contract, relative to the optimal revenue. We also investigate the potential impact of minimum wage requirement.

093-1577  Dynamic Pricing with Strategic Customers

Opher Baron, Professor, University of Toronto, Canada
Simai He, Professor, Shandong University of Finance & Economics, China
Hongsong Yuan, Assistant Professor, Shanghai Univ. of Finance and Economics, Cocos (Keeling) Islands
Consumers often buy a lot more during a sales period, which affects future sales when they still have excess inventory. We consider how to optimize the profit with such strategic consumer behavior.

093-1839  New Bounds for Assortment Optimization Under the Nested Logit Model
Sumit Kunnumkal, Assistant Professor, Indian School of Business, India
We consider the assortment optimization problem under the nested logit model and obtain new bounds on the gap between the optimal expected revenue and an upper bound based on a certain continuous relaxation of the assortment problem. We show that the bounds carry over to the cardinality constrained case.

093-1459  Capacitated and Bounded Pricing Under Multinomial Logit Choices
Gwangjae Yu, Student, Arizona State University, United States
Hongmin Li, Associate Professor, Arizona State University Tempe, United States
Scott Webster, Professor, Arizona State University Tempe, United States
We consider a constrained pricing problem in which a firm determines prices of multiple products when the capacity and/or price of the products are constrained. We characterize the optimal solution and present efficient solution approaches. We illustrate the practical application of the problem in the hotel industry.

093-1136  An Empirical Study of Caller Behavior under a Callback Option
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 US commercial bank, we perform an empirical study of caller behavior under a callback option. We formulate a structural model of the caller decision-making process and impute their underlying preferences. We conduct counterfactual analyses of how various callback policies affect service quality and system throughput.

093-1192  Inventory Decision Biases in the Field: Evidence From a Pharmacy Retail Chain
Yixin Iris Wang, Assistant Professor, University of Illinois Urbana-Champaign, United States
Jun Li, Assistant Professor, University of Michigan - Ann Arbor, United States
Stephen Leider, Assistant Professor, University of Michigan Ann Arbor, United States
Managers sometimes deviate from the ordering quantities recommended by the decision support system. Using historical data, we investigate the drivers of managers' deviation decisions and identify several behavior biases.

093-1581  Customer Preference and Station Network in the London Bike Share System
Pu He, Student, Columbia University, United States
Fanyin Zheng, Assistant Professor, Columbia University, United States
Elena Belavina, Assistant Professor, Cornell University, United States
Karan Girotra, Professor, Cornell University, United States
We study customer preference for the bike-share system in the city of London. We estimate a structural demand model on the station network to learn the preference parameters and use the estimated model to provide insights on the design and expansion of the bike-share system.

093-2088  Data Analytics in Auto Supply Chains
Ahmet Colak, Assistant Professor, Clemson University, United States
Robert Bray, Associate Professor, Northwestern University, United States
Combining public and private auto industry data, we derive novel consumer-level and firm-level variables that influence quality improvement in recalls. Accounting for various product characteristics and spillover effects, we study a panel data from 1994 to 2015. We use data analytics and structural estimation to test main automotive quality drivers.

093-1903  Search Engine Advertising and Contractual Strategies Between a Parent Firm and its Online Search Infomediary
Siddharth Bhattacharya, Student, Temple University, United States
Abhishek Roy, Assistant Professor, Temple University, United States
Subodha Kumar, Professor, Temple University, United States
Sunil Wattal, Associate Professor, Temple University, United States
Growing trends in online search advertising show firms increasingly utilizing online search infomediaries (OSI) to advertise on their behalf. The focus of our research is to find what optimal pricing and advertising strategies between firms and these OSIs maximize profits and how does presence of other competitors affect these strategies.

093-2042  Guilty By Association: Spillover Effects of Hosting "Bad" Online Reviews
Subodha Kumar, Professor, Temple University, United States
Paul Pavlou, Professor, Temple University, United States
Growing trends in online search advertising show firms increasingly utilizing online search infomediaries (OSI) to advertise on their behalf. The focus of our research is to find what optimal pricing and advertising strategies between firms and these OSIs maximize profits and how does presence of other competitors affect these strategies.
Online reviews of products and services are prone to biases, yet according to previous research consumers tend to overestimate their validity. We use a series of behavioral experiments to address this issue further by investigating the role of known cognitive biases in consumers' interpretation of online reviews and subsequent decisions.

093-2174 An Examination of Engagement of Satirical and Traditional News Stories in Social Media
Debashish Ghose, Student, Temple University, United States
Subodha Kumar, Professor, Temple University, United States
Susan Mudambi, Professor, Temple University, United States

Many social media users enjoy entertaining news satire from sources like TheOnion.com. Unlike traditional news, satire often features celebrities and leading brands to comedic effect. We empirically investigate whether and how brand names and language use lead to higher engagement of satirical news in comparison to traditional news.

093-0893 Impact of the Interplay Between Review Volume and Rating in Digital Platforms on Sales
Samayita Guha, Student, Temple University, United States
Naveen Kumar, Assistant Professor, ????, United States
Joydeep Srivastava, Professor, Temple University, United States
Subodha Kumar, Professor, Temple University, United States

Consumers now increasingly depend on user-generated reviews. Based on the data collected from a digital-platform, we empirically examine the impact of interaction between the number of reviews and the average rating on sales.

093-1200 Optimal Parts Feeding Policy Decision for Mix-Module Assembly System
Lve Tao, Student, Northeastern University, China
Lixin Tang, Professor, Northeastern University, China
Yang Yang, Associate Professor, Northeastern University, China

We aimed to decide the optimal feeding policy for different parts in different production scenarios. Besides three traditional feeding policies, we studied some variant strategies, such as downsizing and sequencing, a multi-level inventory system on which the feeding procedure relied is also considered.

093-1244 Machine-Learning Based Models for the Estimation of Manufacturing Flow Time
S MAHESH, Student, Indian Institute of Technology Madras, India
Rajendran Chandrasekharan, Professor, Indian Institute of Technology Madras, India

Large volumes of data in the shop floor database make the scheduling system amenable to machine-learning techniques. The work explores new dispatching rules and due date setting methodologies coupled with machine-learning techniques for manufacturing systems, modeled using simulation and evaluated using several measures of performance.

093-1266 The Dynamic Allocation Problem for Open-Order Slab with the Consideration of Energy Consumption
Guilin Feng, Student, Northeastern University, China
Lixin Tang, Professor, Northeastern University, China
Ying Meng, Lecturer, Northeastern University, China

The dynamic allocation problem for open-order slab is to allocate the combination of slab to unfulfilled orders with consideration of energy consumption. An integer programming model is formulated. Then, an approximate dynamic programming algorithm is developed to obtain near-optimal solution. Finally, the performance is evaluated by experiments.

093-1275 Vehicle Scheduling in the Open-Pit Mine via Reinforcement Learning
Fengyuan Shi, Student, Northeastern University, China
Lixin Tang, Professor, Northeastern University, China

This paper focuses on a homogeneous vehicle scheduling in the open-pit mine, which is described as Markov decision process formulation. Reinforcement learning method is utilized to learn real-time and online policy used to allocate vehicle to task. Finally, a case study is conducted to show the performance of the decomposition policy.

093-0706 Business Strategy and Dynamic Capabilities to Manage Pharmaceutical Projects - An Exploratory Study in India
Jigeehs Nasina, Professor, Department of Operations & IT, India
Friday, 09:45 AM - 11:15 AM

Raja Shekar Reddy M, Associate Professor, Administrative Staff College of India (ASCI), Hyderabad, India
Prabhukumar A, Professor, School of Management Studies, Jawaharlal Nehru Technological University, Hyderabad, India

Pharmaceutical companies should upgrade capabilities to meet demands and maintain competitive advantage. This study looked at case studies and surveys in India to assess the influence of various factors on pharmaceutical project success. Structural equation modeling of data results show that both business strategy and dynamic capabilities are necessary antecedents.

093-2044 The Cherry Picking Effect
Christina Phillips, Lecturer, University of Leeds, United Kingdom
Konstantinos Nikolopoulos, Professor, Bangor University, United Kingdom

We define the effect of customer batch preferencing on operations as observed in a pharmaceutical manufacturer, and explore methods to model this as a systemic input to operational models. The effect is similar to the rationing behavior described in the bullwhip effect literature causing stochastic sales spikes.

093-2309 Recalls, Innovation, and Learning: An Empirical Examination of Interrelationships
Gopesh Anand, Associate Professor, University of Illinois Urbana-Champaign, United States
Ujjal Mukherjee, Assistant Professor, University of Illinois Urbana-Champaign, United States

This research seeks to enhance our understanding of the impact of product recalls on organizational learning by distinguishing between design-related and process-related recalls, and by incorporating innovation orientation as a facilitator of such learning. Our hypotheses are tested on longitudinal data from the medical devices and pharmaceuticals manufacturing industries.

093-0221 Does the Effectiveness of Automotive Recall Process Affect Market Share? An Empirical Study
Anto Verghese, Assistant Professor, University of Wisconsin-Whitewater, United States
David Peng, Associate Professor, University of Houston, United States
Arunachalam Narayanan, Assistant Professor, University of Houston, United States

Using automotive recalls data from 2000 to 2018, we examine the impact of recall responsiveness on recall completion ratio at the brand level. Subsequently, we determine if recall completion ratio positively impacts market share. We further explore if product type moderates the proposed relationships.

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Invited Session: Designing and Learning from Clinical Trials
Chair(s): John Silberholz

093-0767 Bayesian Sequential Learning for Clinical Trials of Multiple Correlated Medical Interventions
Ozge Yapar, Student, University of Pennsylvania, United States
Stephen Chick, Professor, INSEAD, France
Noah Gans, Professor, University of Pennsylvania, United States

We address the design of adaptive trials that consider the cost-effectiveness of multiple alternatives. Our goal is to identify a sequential sampling policy that dynamically decides the interventions to which patients should be allocated and when to stop patient recruitment to maximize expected population-level benefit minus the trial cost.

093-1002 Dynamic Programming for Adaptive Dose-Finding Clinical Trials
Amin Khademi, Assistant Professor, Dr., United States
Amir Ali Nasrollahzadeh, Student, Clemson University, United States

Identifying the right dose is one of the most important decisions in drug development. Adaptive designs are promoted to conduct dose-finding clinical trials as they are more efficient and ethical compared to static designs. However, current techniques in response-adaptive designs of dose allocations are complex and need significant computational effort.

093-1859 Value-Based Clinical Trial Design to Account for Features of Pragmatic Trials
Andres Alban, Student, INSEAD, France
Martin Forster, Lecturer, University of York, United Kingdom

We extend existing Bayesian models of two-armed clinical trials which balance sampling costs and social welfare of technology adoption decisions to handle specificities of pragmatic trials and of technology adoption durations. We optimize the recruitment rate and duration of such trials and apply the model to data from published studies.

093-1909 Adaptive Clinical Trial Designs with Surrogates: When Should We Bother?
Arielle Anderer, Student, University of Pennsylvania, United States
Hamsa Bastani, Assistant Professor, University of Pennsylvania, United States
John Silberholz, Assistant Professor, University of Michigan, United States

Surrogate outcomes have long been used in clinical trials when a true outcome is too expensive or time-consuming to measure. In this work we propose optimal adaptive clinical trial designs that integrate surrogate and true outcomes, and we analytically and empirically characterize regimes where our designs are especially beneficial.

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Invited Session: Managing Capacity and Patient Flows
Chair(s): Pengyi Shi

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Managing Outpatient Care Services Under Strategic Walk-In Patients

Nan Liu, Assistant Professor, Boston College, United States
Willem Jaarsveld, Van, Assistant Professor, tu/e, Netherlands
Shan Wang, Student, Shanghai Jiao Tong University, China
Guanlian Xiao, Student, tu/e, China

In outpatient care, patients may choose to book an appointment or to walk in directly, depending on their health condition and the utility of each option. We discuss how an outpatient care provider should manage their capacity taking into account such strategic behavior of patients.

Managing Quality of Care for Healthcare Services: The Role of Social Learning and Competition

Linggang Qi, Student, City University of Hong Kong, China
Zhan Pang, Associate Professor, Purdue University, United States
Sergei Savin, Professor, University of Pennsylvania, United States

We study a healthcare market where hospitals are competing on quality, which may be inferred from online patients' reviews when it is unknown and patients are sensitive to both quality-of-care and waiting times. We analyze the rational equilibrium behavior of patients and Nash equilibrium quality decisions.

Proactive Care with Degrading Class Types

Yue Hu, Student, Columbia University, United States
Carri Chan, Associate Professor, Columbia University, United States
Jing Dong, Assistant Professor, Columbia University, United States

Early treatment of less severe patients may reduce the need for more expensive resources later, but could also reduce available resources for more critical patients. We propose a two-class multi-server queueing model to understand how patients should be prioritized when proactive care can be used in a resource-limited healthcare setting.

Patient Experience: Service Operations in Healthcare

Alexis Strong, Student, Cornell University, United States
Rohit Verma, Professor, Cornell University, United States

Value Based Care (VBC) put a spotlight on patient experience in the U.S. Researchers have yet to create a framework that represents the full ecosystem of the patient experience across the healthcare journey. This paper leverages two annual surveys to develop that framework and explore optimization using service operations.

An Investigation of the Effects of Performance Feedback on Quality Improvement in US Hospitals

Onyi Nwafor, Assistant Professor, University of North Carolina Greensboro, United States
Norman Johnson, Professor, University of Houston, United States

A widely-accepted tenet in healthcare is that operational performance feedback stimulates quality improvement. However, there is a paucity of empirical research to support this notion. We apply a process theory of organizational decision-making to investigate the effect of performance feedback on quality improvement and organizational factors that affect this relationship.

Factors Influencing Service Quality in Hospitals

Vivekanand Khanapuri, Professor, National Institute of Industrial Engineering, Mumbai, India
Priyanka Singh, Student, National Institute of Industrial Engineering, India

This study identifies factors influencing service quality in the healthcare sector. Framework comprising of factors related to technical and functional quality influence service developed. Data on customer experience in hospitals is captured and analyzed in SMARTPLS. Factors with a high path coefficient identified include explicit and implicit service along with support facilities.

The Role of Family Commitment for Patient Satisfaction: A Study of Korean Healthcare

Joonhyuk Bok, Student, Rensselaer Polytechnic Institute, United States
Christopher Mcdermott, Professor, Rensselaer Polytechnic Institute, United States

We explore the extent to which different levels of caregiver commitment are associated with perceptions of healthcare quality and patient satisfaction in an in-patient care setting. We would like to see the effect of caregiver commitment on healthcare quality and patient satisfaction with a moderator of family caregivers.

SEM Predicting Overall Patient Satisfaction in Rural Healthcare Systems

Quinton Nottingham, Associate Professor, Virginia Polytechnic Institute And State University, United States
Sameer Kumar, Professor, University of St. Thomas, United States
Dana Johnson, Professor, Michigan Technological University, United States
Sheneeta White, Associate Professor, University of St. Thomas, United States

Quality of care and psychometric variables serve as strong predictors of overall patient satisfaction with doctor and healthcare systems. SEM was used to uncover the strength of the relationships of a healthcare unit that is part of a larger Midwestern rural system.
Contributed Session: Strategic Decision Making and Mechanism Design
Chair(s): Nan Liu

093-1013  Backup Order Matters: Optimal Two-Stage Order Policy of Capital-Constrained Retailers with Different Financing Schemes
Nina Yan, Professor, Central University of Finance And Economics, China
Bing Yan, Student, Central University of Finance And Economics, China
Considering the capital-constrained retailer with a two-stage ordering opportunity, we discuss optimal strategies under different financing schemes based on capital gap or credit lines. Through comparative analysis, we find whether backup ordering would be adopted depends highly on retailer's capital constraint and bank loan offerings.

093-1017  Ex-Ante and Ex-Post Subcontracting Between Two Competing Bidders
Sijing Deng, Assistant Professor, South China Normal University, China
We consider a procurement auction between two capacity constrained bidders. Due to the capacity constraint, neither bidder is able to individually fulfill the buyer's project. We investigate ex-ante and ex-post subcontracting between bidders, and find that subcontract timing has a fundamental impact on bidders' behavior and profits.

093-0057  A Study of Two-Stage Pricing Schemes of "Redirect" Logistics Services
Yu Zhang, Student, Zhejiang University, China
Nan Liu, Professor, Zhejiang University, China
A "redirect" service allows customers to adjust the arrival time of the goods in transit, thus increasing the flexibility of the logistics service. However, this flexibility is more costly for logistics service providers. Therefore, it is necessary to design appropriate pricing mechanisms to ensure the sustainability of this flexible service.

Contributed Session: Sustainable Supply Chains
Chair(s): Constantin Blome

093-0111  Challenges in Sustainable Supply Chain
Amulya Gurtu, Assistant Professor, University of Wisconsin, Green Bay, United States
This is an empirical study of challenges in implementing sustainable practices in supply chain management (SCM). A survey of SCM professionals and organization leaders has been designed. The survey is being administered to understand the issues and challenges/barriers from the perspective of SCM professionals in the USA.

093-0489  A Meta-Analysis of Sustainable Supply Chain Management and its Relationship to Performance
Lu Xu, Assistant Professor, University of North Georgia, United States
Xianghui (Richard) Peng, Assistant Professor, Penn State University Erie, United States
Victor Prybutok, Professor, University of North Texas, United States
We conduct a meta-analysis on the empirical studies in sustainable supply chain management. The results allow an evaluation of relationships between sustainable supply chain management practices and performance in terms of economic sustainability, environmental sustainability, and social sustainability. We also examine the contingent effects of contextual factors.

093-2452  Role of Power Dynamics for Greening Investment in Sustainable Supply Chain-Contracts, Efficiency and Channel Performance
Abhishek Srivastava, Student, Indian Institute of Management Kozhikode, India
Arqum Mateen, Assistant Professor, Indian Institute of Management Kozhikode, India
We consider a two echelon supply chain where the retailer and the manufacturer can invest into greening innovation. A Stackelberg game is used, with manufacturer-dominance and retailer-dominance scenarios, depending upon their relative power. We analyze the impact of both greening investment choice and pricing decisions on supply chain profit.

093-1935  Buyer-Supplier Social and Environmental Asymmetries and Performance: Assessing Both Sides of the Relationship
Maria Montes-Sancho, Associate Professor, University of Carlos III Madrid, Spain
Elicio Tachizawa, Associate Professor, EAE Business School, Spain
Constantin Blome, Professor, University of Sussex, United Kingdom
Supply chain partners attempt to share values and behaviors to achieve high performance outcomes. Prior studies have tended to overlook buyer-supplier asymmetries, focusing on just one side. Building on the literature of homophily and complementary assets, this study empirically analyzes how the imbalances in the sustainability subdimensions affect their performance.
Enterprise social media platforms (ESMPs) have been widely adopted by companies to promote help between employees, but with mixed results. We experimentally study different ESMP designs and how they affect helping behavior and productivity. We show that setting helping goals with non-monetary rewards significantly improves participant performance and helping behavior.

We consider a decision maker who manages inventory for servicing technical systems. He/she must decide on the order quantities of multiple products to optimize the availability of the system. This is a common and complex task. We analyze how information and decision support can help increase performance.

We analyze how team and individual incentives affect an organization's propensity to adopt a risky strategic project. We recognize that these projects are mostly carried out by a cross-functional team of specialists whose tasks are interdependent and uncertain, and the degree to which their tasks interact is also uncertain.

We explore knowledge transfer, development (KD) and market strategies of two firms' new products competing in the same market. We develop conditions for firms to engage in KT and KD, and enter the marketplace, and examine the impact of firm and market characteristics, such as absorptive capacity and valuation uncertainty.

We consider a firm who employs competing internal teams for the development of a single product, but needs to involve key suppliers in this process. We explore how the internal competition affects the suppliers' collaborative efforts and firm profits, and how the firm should allocate the teams to potential suppliers.

We consider the demand forecasting and inventory control problem with intermittent usage. We first use a portfolio approach using an estimate of the joint distribution of demand and interarrival time. We then propose a distributionally robust model to determine the state-dependent order-up-to levels.

We consider the simulation inventory systems with unknown demand models. Our goal is to investigate the impact of the uncertainty on the performance measures that is due to the estimation the unknown demand models and their parameters especially in the presence of limited amounts of historical demand data.

We study a product rental network with rental units distributed across multiple locations. Customers could decide how long to keep a unit and where to return it. We characterize the optimal repositioning policy. We also construct a new ADP algorithm that is practically efficient and asymptotically optimal.
Friday, 09:45 AM - 11:15 AM

Invited Session: Service Operations Strategy
Chair(s): Kamalini Ramdas Amrita Kundu

093-0494 Challenges of Online Retail in Emerging Markets
Antonio Moreno, Associate Professor, Harvard University, United States
The talk discusses some of the challenges of online retail in emerging markets, focusing on issues such as infrastructure and management of payments.

093-1680 Does Online Training Work in Retail?
Marshall Fisher, Professor, The Wharton School, United States
Santiago Gallino, Assistant Professor, The Wharton School, United States
Serguei Netessine, Professor, The Wharton School, United States
A knowledgeable retail sales associate (SA) can explain the features of available product and give a customer confidence in their choice or suggest alternatives. Thus, an important research question is how much, if at all, does training on product features increase a SA’s sales productivity?

093-2134 Improving Customer Compatibility with Operational Transparency
Ryan Buell, Associate Professor, Harvard Business School, United States
MoonSoo Choi, Student, Harvard Business School, United States
When marketing their offerings to prospective customers, companies often shroud the operational tradeoffs inherent in their offerings in favor of emphasizing their advantages. Through a large-scale field experiment with a nationwide retail bank, we investigate how providing prospective customers with transparency into an operation’s tradeoffs affects acquisition and engagement.

093-0774 Is After Sales Service Important for Technology Adoption in Emerging Markets?
Amrita Kundu, Student, London Business School, United Kingdom
Kamalini Ramdas, Professor, London Business School, United Kingdom
We empirically assess the impact of after-sales service on adoption and continued use of new technology in emerging markets. In particular, we measure after-sales service quality provided by a solar distribution company operating in off-grid communities in Uganda and quantify its impact on future adoptions and sales of the company.

Friday, 09:45 AM - 11:15 AM
Columbia 12
Track: Service Operations

Invited Session: Emerging topics in Humanitarian Operations and Crisis Management
Chair(s): Shouqiang Wang

093-0041 Designing Supply Chain Against Bioattacks
Peter Yun Zhang, Student, Massachusetts Institute of Technology, United States
Nikos Trichakis, Associate Professor, MIT, United States
David Simchi-Levi, Professor, Massachusetts Institute of Technology, United States
We study the problem of designing supply chain against bioattacks. We propose a model that integrates key facets: medical countermeasure (MCM) stock level, capacity, shipment, and dispensing. We also explicitly capture the interaction between defender and attacker.

093-0050 Supply Management for the Immediate Relief Period of Rapid-Onset Disasters
Mahyar Eftekhar, Assistant Professor, Arizona State University Tempe, United States
Jing-Sheng Song, Professor, Duke University Durham, United States
Scott Webster, Professor, Arizona State University Tempe, United States
To fulfill beneficiaries’ demands, humanitarian organizations should design a cost-efficient and time-effective procurement policy. We consider and analyze two common supply management policies: pre-positioning and local-purchasing. Our analysis takes demand, supply, and budget uncertainties into account.

093-0751 Disaster Management: Impact of Mitigation on Preparedness and Response
Shabnam Rezapour, Assistant Professor, Florida International University, United States
Reza Zanjirani Farahani, Associate Professor, Kingston University London, United Kingdom
Alfonso Pedraza-Martinez, Associate Professor, Indiana University, United States
Anchored in the disaster management cycle, stochastic cost-minimization models are developed to answer: i) What is the best inventory prepositioning strategy in the preparedness phase is and ii) How does disaster mitigation affect disaster preparedness and response. The models are solved using real data from a hurricane-prone region in the US.

093-0413 Warning Against Recurring Risks: An Information Design Approach
Saed Alizamir, Assistant Professor, Yale University, United States
Francis De Vericourt, Professor, ESMT, Germany
Shouqiang Wang, Assistant Professor, University of Texas Dallas, United States
In this work, we examine inventory systems with proactive transshipments, analyze an optimal structure of transshipment network, and provide a near-optimal transshipment policy.
Public agencies typically emit warnings to the stakeholders about potential disastrous events. In a repeated setting, they need to incentivize the public to take preventive actions in the current period while managing their credibility in the future. We characterize the optimal warning policy that balances such a tradeoff.

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**Contributed Session: Data Analytics and Humanitarian Operations**

**Chair(s): Gopalakrishnan Narayanamurthy**

**093-1320** Quantifying Disaster Risk in Hurricane Florence to Support Sheltering Decisions

Duygu Pamukcu, Student, Virginia Tech, United States  
Andy Arnette, Assistant Professor, University of Wyoming, United States  
Christopher Zobel, Professor, Virginia Tech, United States

This study looks at quantifying the risk of a natural disaster by measuring it as a function of different indicators of hazard severity, in order to support more effective decision-making for emergency responses. The resulting risk measure is evaluated in the context of managing emergency shelters during Hurricane Florence.

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**093-1188** The Role of Big Data Analytics and Artificial Intelligence in Disaster Relief Operations

Rameshwar Dubey, Associate Professor, Montpellier Business School, France

The role of innovative technologies in disaster relief operations is gaining significant attention from humanitarian operations management scholars. In this study, we present a survey-based study to explain the role of big data analytics and artificial intelligence on coordination among various humanitarian actors engaged in relief operations.

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**093-0145** Does Operations Management Contribute to Make Corporate Governance More Effective in Terms of Sustainability?

Cristina Sancha, Associate Professor, OBS Business School, Spain  
Leopoldo Gutierrez, Associate Professor, University of Granada, Spain  
Ignacio Tamayo-Torres, Associate Professor, University of Granada, Spain  
Cristina Gimenez, Professor, Esade Business School, Spain

The objective of this paper is to better understand the relationship between governance and sustainability. We adopt the ESG (Environment, Social, Governance) focus. More specifically, by using secondary data, we aim to reveal the role played by sustainability in deploying an effective sustainability governance strategy.

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**093-1814** Humanitarian Relief Operations Using Satellite Bigdata Analytics

Narayan Nagendra, Student, Friedrich-Alexander Universitat Erlangen-Nurnberg, Germany  
Gopalakrishnan Narayanamurthy, Lecturer, University of Liverpool, United Kingdom  
Roger Moser, Assistant Professor, University of St. Gallen, Switzerland

In this paper, we discuss how satellite big data analytics built over real-time weather information, geospatial data, and deployed over a cloud-computing platform, aided in achieving improved coordination and collaboration between rescue teams for humanitarian relief efforts in the case of Kerala floods in 2018.

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**Invited Session: Emerging Topics in Empirical Operations Management**

**Chair(s): Weiming Zhu**

**093-0298** Estimating and Optimizing the Impact of Photo Assortment in Sharing Economy

Hanwei Li, Student, Massachusetts Institute of Technology, United States  
David Simchi-Levi, Professor, Massachusetts Institute of Technology, United States  
Xiao Wu, Post Doc/Researcher, Massachusetts Institute of Technology, United States  
Weiming Zhu, Assistant Professor, I E S E, Spain

We employ Neural Networks to discern the quality and the context of Airbnb photos, then we construct a consumer choice model to estimate the impact of photo quality and photo assortment on apartment revenue. Finally, we derive an optimal assortment strategy through counterfactual analysis.

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**093-0657** Are All Outlets in a Service Network Equally Important? Measuring Outlets Influence Using Network Analysis

Qiuping Yu, Assistant Professor, Indiana University, United States  
Masha Shunko, Assistant Professor, University of Washington, United States  
Shawn Mankad, Assistant Professor, Cornell University, United States

Consider a network of service outlets sharing the same brand. Improving performance at one location may have a different impact on other outlets: from a negative impact of cannibalization, to a positive impact of reputation or knowledge spillover. We causally identify such network effect using a large dataset from a major restaurant chain.

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**093-2078** Externalities of Online Market Expansion

Wenchang Zhang, Student, University of Maryland, United States  
Wedad Elmaghraby, Professor, University of Maryland, United States

Expansion strategy is one of the keys to the success of online platforms. We empirically identify the positive externalities of the expansion of a multi-market platform. In particular, including a low-tier market significantly increases the buyers' retention in its high-tier market. Our findings provide implications on platform's expansion strategy.
<table>
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<tr>
<th>Session ID</th>
<th>Title</th>
<th>Chair(s)</th>
<th>Authors and Affiliations</th>
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<tbody>
<tr>
<td>093-2428</td>
<td>Practice Leaders Forum 1</td>
<td>Claire Senot, Carrie Queenan</td>
<td>Amit Garg, CEO, CRMantra, Inc., United States</td>
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<td>Kevin Knarr, Senior Vice President, Operations Modernization and Performance Effectiveness, United Health Group, United States</td>
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<td>Linda Whitaker, VP Science, Cognira, United States</td>
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<td>This session presents various operational challenges, solutions and innovations observed by practice leaders in customer relationship management, healthcare, and retail industries respectively. Their views open up research opportunities for OM researchers.</td>
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<tr>
<td>093-2002</td>
<td>Managing Flexible Seat Capacity in Airline Revenue Management</td>
<td>Suresh Sethi, Xishu Li</td>
<td>Zhichao Feng, Student, University of Texas Dallas, United States</td>
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<td>Ang Li, Scientist II, PROS Inc, United States</td>
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<td>In many European airlines, business seats are exactly the same as economy seats except middle seats are kept empty in business class. Therefore, seating capacity is flexible in the sense that each seat can be allocated to either business or economy. Considering this flexibility, we study the optimal capacity control.</td>
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<td>093-1959</td>
<td>Stock Rationing in an M/E_k/1 Make-to-Stock System with Limited-Patience Spot Customers</td>
<td>Weina Ma, Rob Zuidwijk, Chiel van Oosterom, Rommert Dekker, René De Koster, Suress Sethi</td>
<td>Weina Ma, Post Doc/Researcher, Erasmus University Rotterdam, Netherlands</td>
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<td>Chiel van Oosterom, Assistant Professor, Erasmus University Rotterdam, Netherlands</td>
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<td>Suress Sethi, Professor, University of Texas Dallas, United States</td>
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<td>We take into account real-time information on replenishment orders and waiting customers from different classes in stock rationing. Spot customers can be rejected, satisfied, or put on the waiting list. They may also leave after having waited too long. The problem is modeled as a Markov decision process.</td>
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<td>093-1925</td>
<td>Launching Next-generation Products in a Competitive Market</td>
<td>Xishu Li, Rob Zuidwijk, René De Koster, Suress Sethi</td>
<td>Xishu Li, Assistant Professor, Erasmus University Rotterdam, Netherlands</td>
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<td>Suress Sethi, Professor, University of Texas Dallas, United States</td>
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<td>Most product transits failed, some even led to company bankruptcies. We study how a firm should launch a next-generation product, which is a quality upgrade to the existing product, in a competitive market.</td>
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<td>093-1484</td>
<td>Optimal Sales Effort of the Seller and Buyers in Social E-Commerce</td>
<td>Hongyan Xu</td>
<td>Lei Guan, Assistant Professor, Beijing Institute of Technology, China</td>
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<td>Haiwen Ma, Student, Beijing Institute of Technology, China</td>
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<td>Lianmin Zhang, Assistant Professor, Nanjing University, China</td>
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<td>In Social E-commerce, both the seller and buyers can work as the sales agent. In this research, we study the optimal sale efforts to maximize the seller's revenue when considering different sequences of actions. The dynamic decision process of buyers is also investigated.</td>
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<td>093-0212</td>
<td>Optimal Advertising Outsourcing Strategy with Different Effort Levels and Uncertain Demand</td>
<td>Hongyan Xu</td>
<td>Yue Xie, Assistant Professor, Zhejiang University of Technology, China</td>
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<td>Wanhua HE, Student, University of Hong Kong, Hong Kong</td>
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<td>Wai-Ki Ching, Professor, University of Hong Kong, Hong Kong</td>
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<td>Allen H. Tai, Lecturer, Hong Kong Polytechnic Univ, Hong Kong</td>
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<td>This paper studies the issue of advertising, outsourcing, and production planning for a manufacturer facing asymmetric advertising cost and uncertain market demand. A contract, taking into account both advertising effort level and payment, is introduced to incentivize the advertising agency to report the exact cost. Optimal strategies are obtained.</td>
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<td>093-0030</td>
<td>Manufacturer's Information Sharing Strategy Under Upstream Competition and Endogenous Capacity Allocation</td>
<td>Hongyan Xu</td>
<td>He Huang, Professor, Chongqing University, China</td>
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<td>Xiaomin Liu, Student, Chongqing University, China</td>
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<td>In this paper, we investigate the manufacturer's information sharing strategy when two suppliers compete for the supply and decide their capacity allocation.</td>
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<td>Session ID</td>
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<td>093-0405</td>
<td>Hunger Game - A Competitive Supply Chain Simulation</td>
<td>Xun Xu</td>
<td>We invented an online game for OM class, called “Hunger Game”, in which a group of students will compete with each other under a supply shortage when playing. We will discuss how it works and the effectiveness of it to understand the Newsvendor model, supply shortage, information's role, and a fair share concept.</td>
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<tr>
<td>093-2161</td>
<td>Disaster Response Game</td>
<td>Ozalp Ozer, Michael Klein, Peter Jackson, Miho Mazereeuw</td>
<td>We develop a software platform for disaster response. We include administration interfaces for designing cases for different disaster scenarios, along with interfaces for the corresponding multi-player disaster response games.</td>
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<tr>
<td>093-1449</td>
<td>Why Use Experiential Learning Games in Your Classroom?</td>
<td>Ozalp Ozer, Michael Klein, Peter Jackson, Miho Mazereeuw</td>
<td>We will discuss why, how, and when teaching and learning fundamental concepts in OM and SCM through role-based interactive games can create fun, engaging, and effective discussions in the classroom. To do so, we will demonstrate and show how some of these games are currently used in various schools.</td>
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<tr>
<td>093-1548</td>
<td>Teaching Operations Management Using In-Class Games</td>
<td>Xun Xu</td>
<td>Motivating students to learn operations management can improve their learning efficiency. I present several in-class games that can help students learn operations management and management science related contents with more interests. Each in-class game is theory-based and has been proved to be efficient and welcomed by students.</td>
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<tr>
<td>093-1858</td>
<td>Sustainability Practices in Port Terminals in Brazil</td>
<td>Stefania Boscari</td>
<td>Based on a literature review on sustainability practices, the objective of this work was to investigate which sustainability practices are being applied in port terminals in Brazil. The multiple case study aims to acquire the answers of five terminals, located in the three largest Brazilian ports.</td>
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<tr>
<td>093-2241</td>
<td>Towards an “Intrinsic” and “Extrinsic” Motivation of Sustainable Business Model Adoption Among Established Firms</td>
<td>Christian Bautista</td>
<td>High consumerism and serious climate change problems have encouraged corporations to embrace sustainability motivated by intrinsic (altruism, brand prestige redemption, and competitive necessity) and extrinsic (regulations and stakeholders’ activism) drivers. This investigation is a comparative analysis between these two motivators in order to provide a framework for corporate sustainability strategy.</td>
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<tr>
<td>093-2356</td>
<td>The Relationship Between Innovations and Sustainable Supply Chain Management Practices: Insights From Case Research</td>
<td>Stefania Boscari</td>
<td>Innovation creation is a complex process in sustainable supply chains. In this paper, we explore the relationship between different levels and types of innovations, and sustainable supply chain management (SSCM) practices. We utilized a multi case study approach to understand how internal and external SSCM practices are developed in firms.</td>
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<tr>
<td>093-1696</td>
<td>Stakeholder Engagement for Effective Environmental Practice Implementation</td>
<td>Stefania Boscari</td>
<td>Although the sustainability literature highlighted the role of stakeholders (e.g., suppliers, employees, customers) for effective environmental management, empirical studies overlooked this factor. Connecting the natural resource-based view with stakeholder theory, we explored how stakeholder engagement affects environmental practice-performance relationships. Results from a survey of manufacturers worldwide provide partial support for our hypotheses.</td>
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<tr>
<td>093-0160</td>
<td>Disruption Risk Mitigation in Supply Chains - The Risk Exposure Index Revisited</td>
<td>Yini Gao, Assistant Professor, Singapore Management University, Singapore</td>
<td>Yini Gao, Assistant Professor, Singapore Management University, Singapore</td>
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In this paper, we propose a method to integrate probabilistic assessment of disruption risks into the REI approach and measure supply chain resiliency by analyzing the worst-case CVaR of total lost sales under disruptions. We show that the optimal inventory positioning strategy can be characterized by a conic program.

**Online Learning and Optimization of (Some) Cyclic Pricing Policies in the Presence of Patient Customers**

Huanan Zhang, Assistant Professor, Penn State University, United States
Stefanus Jasin, Associate Professor, University of Michigan, United States

We consider the joint learning and optimization problem of cyclic pricing policies in the presence of patient customers. We introduce a larger family of policies called threshold-regulated policies, and design a learning algorithm that can converge to an optimal threshold-regulated policy with a tight regret rate.

**Selective Newsvendor Problem with Integrated Marketing, Sales, and Operations**

Jianing Zhi, Lecturer, Penn State University Erie, United States
Burcu Keskin, Professor, University of Alabama Tuscaloosa, United States

We consider a company that has to strategically select a fraction of customers to serve with limited sale forces and quantity dependent lead-time. We build a profit maximization MILP model to determine selling price and inventory procurement policy. A solution approach named R-search is proposed to find the optimal solution.

**The Total Business Volume Commitment Contract and Inventory Replenishment**

Tong Wang, Assistant Professor, Shanghai Jiaotong University, China
Quan Yuan, Associate Professor, Zhejiang University, China
Sean Zhou, Professor, Chinese Univ of Hong Kong, Hong Kong

Motivated from situations in a leading trading company, we study the dynamic inventory planning problem under the total business volume commitment contract. Both single and multiple products scenarios are considered in this work.
Pricing and Reduction Decision for a Remanufacturing-Supply-Chain with Different Charge Methods on Carbon-Emission
Kaiyu Yuan, Professor, Guizhou University of Finance & Economics, China
Xiaoxia Wang, Student, School of Business Administration, Guizhou University of Finance and Economics, China
Welli Chen, Student, School of Business Administration, Guizhou University of Finance and Economics, China
Xiaohong Xiao, Professor, School of Business Administration, Guizhou University of Finance and Economics, China
Suresh Sethi, Professor, University of Texas Dallas, United States

A remanufacturing-supply-chain with different charge methods on carbon-emission is investigated, which includes a manufacturer and a retailer. Using methods of no-charge, partial-charge, and full-charge, the manufacturer and retailer profit-maximization models are derived, and the solution procedures are presented to determine optimal pricing and reduction decisions and related results are compared.

Close-Loop Supply Chain Structures with Remanufacturing Under Carbon Tax Regulation
Guowei Dou, Assistant Professor, Shenzhen University, China

This paper studies the hybrid manufacturing-and-remanufacturing production planning in three different close-loop supply chains under carbon tax regulation. The environmental and economic performance of the three supply chains are compared to find which collection structure is most effective concerning remanufacturing.

Consumer Adoption and Economic Performance of Circular Business Models: The Case of Washing Machines
Ece Guliz Gulserli, Student, INSEAD, France
Luk Van Wassenhove, Professor, INSEAD, France
Joseph Blackburn, Emeritus Professor, Vanderbilt University, United States

We examine the circular economy mandate for leasing instead of buying a product from both consumer’s and manufacturer’s perspectives. Through a survey, we assess consumer preferences between leasing and purchasing. We discuss the implications of these preferences for a transition to circular business models.

The Feedback Stackelberg Equilibriums in Two-Period Inventory Model
Xiuli He, Associate Professor, University of North Carolina Charlotte, United States
Tao Li, Assistant Professor, Santa Clara University, United States
Suresh Sethi, Professor, University of Texas Dallas, United States
Xin Liu, Assistant Professor, Elon University, United States

We consider a decentralized two-period supply chain consisting of a manufacturer and a retailer. Assuming that both the manufacturer and the retailer are either forward-looking or myopic, we characterize the retail prices, the wholesale prices, and the order quantities under the Feedback Stackelberg Equilibrium and compare different scenarios.

Buy-One-Get-One vs Price Reduction Promotions in Supply Chains
Yuefeng Li, Student, University of Electronic Science and Technology of China, China
Jingming Pan, Professor, University of Electronic Science and Technology of China, China
Moutaz Kouja, Professor, University of North Carolina Charlotte, United States
Jing Zhou, Associate Professor, University of North Carolina Charlotte, United States

We derive the optimal policy of a manufacturer-retailer supply chain offering a buy-one-get one (BOGO) promotion in a two-period model. We compare the results of this policy to price reduction promotion. We investigate the effects of stockpiling and consumer holding costs on both promotions.

Design and Pricing of Subscription Services Under Model Uncertainty
Yuan-Mao Kao, Student, Duke University Durham, United States
N. Bora Keskin, Assistant Professor, Duke University Durham, United States
Kevin Shang, Professor, Duke University Durham, United States

We consider a firm providing service to its customers while facing uncertainty about the customers’ preferences. The firm dynamically adjusts the price and duration of service to resolve said uncertainty. We analyze the firm’s optimal contracts under perfect information, and design a policy that performs well under model uncertainty.

Joint Fulfillment and Pricing Decisions for Omni-Channel Retailers
Khosro Pichka, Student, University of Wisconsin-Milwaukee, United States
Xiaohang Yue, Associate Professor, University of Wisconsin-Milwaukee, United States
Layth Alwan, Associate Professor, University of Wisconsin Milwaukee, United States

Omni-channel retailers meet demand with e-fulfillment centers for online orders or by in-store inventory. We consider the added dimension that e-fulfillment centers can fulfill the in-store demands. Retailers can benefit from pricing decisions to control customers’ channel preference and maximize the total profit by considering both revenue and fulfillment costs.
Firstly, measure the carbon footprint of the fresh agri-products industry using the EIO-LCA under non-fresh-cut and fresh-cut patterns. Secondly, construct a network optimization model for fresh agri-products’ supply chain considering the carbon footprint under the two operating patterns. Finally, set parameters by field surveys and references, and solve models using GA.

The research shows that there is a huge difference between the application behaviors of geographical indication brands and that community supervision has a significant promoting effect on green production of tea farmers’ drug application; especially given that the monitoring effect between farmers is more significant. Sometimes a tea farmers’ drug application is unkind behavior.

This research combines the practitioner’s and academic’s perspective to study the implementation of emerging precision-agriculture technologies integrated with ICT for developing nations with the aim of greater food-security. Specifically, we focus on the experimental technique of GPS integrated with real-time kinematics for multipurpose application across the entire agricultural production cycle.

Agriculture industry has gone through outstanding economic and organizational changes in the past century, but hasn’t attracted much business scholarship until recently. I draw lessons from the book, “The Machine that Changed the World”, to explore various trends and challenges in farming and agricultural supply chains.

We develop a framework for social sustainability from the lens of emerging economies and the role that innovation can play in this context. We put forward “inclusive innovation” as a unifying approach that enables the collaborative integration of social issues of relevance to underserved populations in operation management decisions.

We use data from Nigeria to estimate the effect of vaccine availability on routine immunization coverage and to identify factors which affect this relationship. We find that vaccine stockouts significantly decrease the number of children immunized and that for most vaccines, the effect lasts for several months after a stockout.

Two key players in vaccine markets are pharmaceutical companies, who develop and manufacture vaccines, and global health organizations (GHOs), who procure vaccines for countries. We analyze contracts where vaccine price is tied to vaccine effectiveness and study their impact on the ability of GHOs to contain disease outbreaks.

We present a model of donor budget allocation for drug procurement in developing countries. The donor funding can be a lump-sum disbursement, per-unit subsidy, or both. We show that the two types of funding exhibit a risk-hedging synergy and apply the model to 48 African countries using real data.
Friday, 01:45 PM - 03:15 PM

Invited Session: Data-driven Prescriptive Analytics
Chair(s): Kejia Hu

093-0919 Reducing Orthopedic Surgery Times: Managing Tightly-Coupled Team Familiarity and Bottlenecks
David Moore, Fellow, Stanford University, United States
Michael Lapré, Associate Professor, Vanderbilt University, United States

In orthopedic surgery, we argue and find that the team experience that reduces procedure time consists only of the pairs of team members who need to tightly coordinate activities. If the bottleneck pair is tightly coupled, (i) procedures take longer, and (ii) surgeons rely more on individual experience.

093-1121 Wait or No Wait? Examining the Role of Remote Waiting in Influencing Customers’ Perception
Kejia Hu, Assistant Professor, Vanderbilt University, United States
Xun Xu, Assistant Professor, California State University Stanislaus, United States

Via online customer reviews collected from social media, we analyze and compare customers’ perceptions toward restaurant services before and after the launch of a remote waiting app. We found the virtual waiting changes the customers’ perceived quality of restaurant services. We discuss implications of reducing customers’ perceived waiting time.

093-1388 Data Integration for Decision Making in Operations Management
Qi Feng, Professor, Purdue University, United States
George Shanthikumar, Professor, Purdue University, United States

With the development of technology and data availability, increasing attention is paid to data-driven and data-integrated decision making in practice and research. In this talk, we propose a framework of Operational Data Analytics and demonstrate its application through the example of newsvendor model.

Friday, 01:45 PM - 03:15 PM, Jay

Invited Session: Sustainability and Manufacturing
Chair(s): Dincer Konur

093-0762 Environmental R&D Investments Under Consumer, Competitive, and Regulatory Pressures
Arda Yenipazarli, Associate Professor, Georgia Southern University, United States

This paper presents a two-stage duopoly competition model that demonstrates how consumers’ intrinsic costs (due to altruistic concerns) and brand preferences, competitor actions, and regulatory requirements can impact firms’ incentives to exert R&D efforts to reduce the environmental cost of their production processes.

093-1084 Revisiting the Zero-Inventory Property in Remanufacturing
Meltem Denizel, Associate Professor, Iowa State University, United States

The tactical level problem in disassembly operations for meeting the separate demands for disassembled component parts over a planning horizon resembles the uncapacitated lot sizing problem. However, the well-known zero-inventory property does not hold. We address this issue and show how zero-inventory property manifests itself in this context.

093-1801 Joint Energy Management of Manufacturing Plant and On-Site Microgrid Using Neural-Network Based Reinforcement Learning
Wenqing Hu, Assistant Professor, Missouri University of Science and Technology, United States
Zeyi Sun, Assistant Professor, Missouri University of Science and Technology, United States
Yunchao Zhang, Student, Missouri University of Science and Technology, United States

A Markov Decision Process (MDP) model for modeling the joint control of on-site microgrid with renewable sources and manufacturing plant towards sustainability is proposed. A Q-learning iteration combined with function approximation through a neural network is schemed to solve the proposed MDP model and identify the optimal control policy.

093-1159 Balancing Labor Requirements in a Semiconductor Manufacturing Environment
Dincer Konur, Assistant Professor, Texas State University, United States
Patrick Dwyer, Project Manager, Intel Corporation, United States

Semiconductor production follows cycles with heavy construction requirements. During a cycle, the manufacturing facility needs to be heavily modified for the new technology. This modification is labor intensive, but because of scheduling requirements, the labor usage might vary significantly. This study investigates methods to balance labor usage through a cycle.

Invited Session: Waste Management in Retail
Chair(s): Dorothee Honhon

093-0339 The Impact of “Minimum Life on Receipt” (MLOR) Agreements on Perishable Product Supply Chains
Sandra Transchel, Associate Professor, Kuehne Logistics University, Germany

In food supply chains, “minimum-life-on-receipt” agreements are key components in contracts that specify the minimum remaining shelf life that the retailer is willing to accept. We investigate the impact of MLOR agreements on the profitability and waste performance of the retailer, the supplier, and the supply chain as a whole.

093-0662 A Predictive-Prescriptive Model for Food Allocation
Debjit Roy, Associate Professor, Indian Institute of Management Ahmedabad, India
Mid-day meal schemes are popular government subsidized schemes ran in developing economies which incentivizes children to attend school. We first identify the factors that can improve the effectiveness of such state-run food distribution schemes and then develop a predictive-prescriptive model for optimal allocation of food to different schools.

093-1742  
**Buy-One-Get-One-Free: Impact on Waste and Profit**
Dorothee Honhon, Associate Professor, University of Texas Dallas, United States  
Qi Wu, Assistant Professor, Case Western Reserve University, United States  
We study how different forms of promotions (buy-one-get-one-free today/next week) affect food waste in retail stores and post-purchasing. We show that in some cases, the firm can improve its profit and reduce the food waste at the same time by choosing the proper promotion strategy.

**Operational Excellence**
Friday, 01:45 PM - 03:15 PM, Holmed West  
Chair(s): Stefania Boscari Thomas Bortolotti  

093-0255  
**National and Organizational Cultural Work in OM: Cumulative Research**
Richard Metters, Professor, Texas A&M University College Station, United States  
Operations are embedded within both the contexts of the culture of the organization and the prevailing national culture. We present a comprehensive (hopefully) look at what OM scholars have found.

093-0693  
**Lean Manufacturing Effectiveness: The Role of Empowering Leadership**

Khaled Hassan, Student, Esade Business School, Spain  
Cristina Gimenez, Professor, Esade Business School, Spain  
Jordi Trullen, Associate Professor, Esade Business School, Spain  
Cristina Sancha, Associate Professor, Online Business School, Spain  
The objective of this paper is to reveal the role played by empowering leadership in deploying an effective lean manufacturing strategy. Our underlying assumption is that those lean team leaders with empowering characteristics will improve the motivation, commitment, and well-being of their team members, leading to higher levels of performance.

093-1697  
**The Social Side of Improvement Programs: Critical Success Factors and the Effect of Contingencies**
Thomas Bortolotti, Assistant Professor, University of Groningen, Netherlands  
Companies implement improvement programs to achieve operational excellence. Literature identifies various critical success factors for such socio-technical programs, which can vary across contexts. This study focuses on the critical success factors with stronger impacts on the social side of improvement programs, analyzing the effect of major contingencies.

**Next Generation Operations**
Friday, 01:45 PM - 03:15 PM, Gunstone West  
Chair(s): Ramakrishnan Ramanathan  

093-1542  
**Big Data and Performance Measurement in Real-Time**
Darush Khezrimotlagh, Assistant Professor, Pennsylvania State University Harrisburg, United States  
Performance measurement is essential for companies to provide a transparent view for decision-making and to improve performance management. Today’s massive data is generated in real-time. A mathematical method is proposed to show how big companies, with thousands of branches, can continuously track the performance of each branch in real-time.

093-2277  
**A Maturity Model to Run Operations in Smart Communities Using Blockchain**
Nikhil Varma, Assistant Professor, Ramapo College of New Jersey, United States  
Tammi Redd, Associate Professor, Ramapo College of New Jersey, United States  
This research focuses on building a maturity model to build smart-communities using Blockchain technology. Blockchain will provide a digital identity to each individual and device in this network and this identity will be operationalized to facilitate transactions. The operations will be managed by the IOT devices.

093-1230  
**Augmented Visibility of Food Supply Chains: Real-Time Procurement and Distribution Processes Enabled by Digital Technologies**
Luciano Batista, Senior Lecturer, Aston Business School, United Kingdom  
Ramakrishnan Ramanathan, Professor, University of Bedfordshire, United Kingdom  
Wantao Yu, Professor, Roehampton university, United Kingdom  
This paper reports the initial findings of a study exploring the integration of IoT- Big Data-Blockchain technologies to enable augmented visibility of procurement and distribution processes in food supply chains. These technologies support the creation of supply chains highly responsive to contingent disruptions that can potentially lead to food waste/loss.

093-0097  
**Inspection Monitoring of Food Safety Practices in the Brazilian Beef Supply Chain**
Chair(s): Xiaojin Liu
A multi-level analysis of the agency and facility-location factors that may reduce the number and rate of contamination cases among beef processors in Brazil. The findings suggest that agency, local resource availability, and the variety of slaughterhouse inspections are critical institutional factors that indicate effective case detection.

093-0253 A Multilevel Analysis of a Firm’s Ranking Mobility Regarding Environmental Performance
Zuoming Liu, Assistant Professor, University of North Georgia, United States

This study adopts class-mobility model from sociology to analyze the ranking mobility of a corporation’s environmental performance over time and identify firm-level and industry-level covariates that contribute to the mobility. It provides references for practitioners to deal with different covariates so as to align with their operational environmental strategy.

093-0326 Comparison of E-Waste Take-Back Policies
Feifei Shan, Student, University of Science and Technology of China, China
Wenli Xiao, Assistant Professor, University of San Diego, United States
Yen-Ting Lin, Associate Professor, University of San Diego, United States

We analyze three main types of e-waste take-back legislations: advance recycling fee, extended producer responsibility, pre-disposal fee. We obtain the conditions under which one policy dominates the other two and the impact of different parameters. We provide suggestions to policy makers on the adoption of e-waste take-back legislation.

093-0541 The Role of Corporate-Social Responsibility in the Relationship between R&D and Mergers and Acquisitions
Yuqi Peng, Student, University of South Carolina, United States
Sining Song, Assistant Professor, University of Tennessee Knoxville, United States
Yi Xu, Associate Professor, University of Maryland, United States
Yan Dong, Associate Professor, University of South Carolina, United States

Recently CSR has attracted a lot of attention in operations literature and practice. However, how CSR impacts firm innovation, especially the relationship between R&D investment and M&A, has not been studied. Our research provides useful insight into the complex dynamics among CSR, firm innovation, R&D investment, and M&A.

093-0206Optimal Contract for Machine Repair and Maintenance
Feng Tian, Student, University of Michigan - Ann Arbor, United States
Peng Sun, Professor, Duke University Durham, United States
Izak Duenyas, Professor, University of Michigan - Ann Arbor, United States

A principal hires an agent to repair a machine when it’s down and maintain it when it’s up. If the agent exerts effort, the downtime is shortened and uptime is prolonged. Effort is unobservable to the principal. The principal designs the optimal contract to induce the agent’s full effort.

093-0804 Learning and Revenue Maximization in Service Platforms
Kostas Bimpikis, Assistant Professor, Stanford University, United States
Yiannos Papanastasiou, Assistant Professor, University of California Berkeley, United States
Wenchang Zhang, Student, University of Maryland, United States

Platforms such as Upwork have reduced search and information frictions in the service industry. We provide the optimal design of information provision policy taking into account that the quality of new providers is unknown and information about them can only be generated via transactions.

093-1890 Information Design of Time-Locked Sales Campaigns for Online Platforms
CAN KUCUKGUL, Student, University of Texas Dallas, United States
Ozalp Ozer, Professor, University of Texas Dallas, United States
Shouqiang Wang, Assistant Professor, University of Texas Dallas, United States

In this paper, by adopting the framework of Bayesian persuasion, we investigate how an online platform should design its information provision strategy for a time-locked sales campaign. With a high performance mechanism that engineers social learning we show parsimonious message space and sufficient information obfuscation are optimal.
Learning Customer Preferences from Personalized Assortments

We consider a processor who procures a commodity input to produce a commodity output and biomass. We investigate how spot price uncertainty and procurement strategy shape the value of commercialization. We evaluate the net emissions and find that commercialization is environmentally friendly only when biomass demand is not high.

Product Sourcing and Distribution Strategies Under Recall and Disruption Risks

We discuss how to alleviate the consequences of product recalls in the perspective of (outbound) product distribution strategy in joint with (inbound) sourcing decision. The trade-off considered is among the benefit of risk pooling the impacts of product recalls as well as supply disruption risk.

Supplier Planned Replacement and Contracting for Reuse at a Third Party Remanufacturer

Motivated by a dataset provided by a third party remanufacturer in the information technology asset disposition industry, we study the impact of age-based planned replacement and contracting on end-of-use disposition decisions, replacement costs, and environment. Our model captures the lifecycle environmental impact from repair and reuse in the secondary market.

3D Printing vs. Traditional Flexible Technology: Implications for Operations Strategy

The emerging 3D printing technology represents an advancement of flexible manufacturing. This paper uses the discrete choice framework to compare the implications of 3D printing and the traditional flexible technology.

The Exponential Choice Model: Assortment Optimization and Application to Public Transit Choice Prediction in San Francisco

In this paper, we consider the yet-uncharted assortment optimization problem under the Exponential Choice model, where the objective is to determine the revenue maximizing set of products that should be offered to customers. Our main algorithmic contribution comes in the form of a fully polynomial-time approximation scheme (FPTAS).

The Role of Product and Market Information in an Online Marketplace

We study how the provision of product information and/or market information affects buyers' and sellers' behavior in an online marketplace and how said online marketplace performs financially (i.e., sales and sales volume) as a result.

Main Products and Recommendations: Substitution and Complementarity

This paper studies assortment and pricing for main products and personalized recommendations regarding associated complementary products, a common practice in recent e-commerce to enhance consumers' shopping experiences. Our framework reveals that personalized recommendations for complementary products not only generate a new stream of revenue, but also enhance consumer surplus.

Neighborhood Selection to Maximize Recommendation Diversity

Recommendation systems are utilized in many domains such as e-commerce, social networks, entertainment, and apps. Recent studies have recognized the importance of diversity for evaluating recommendation quality. We propose a methodology that optimizes neighborhood selection to maximize recommendation diversity without compromising accuracy when making recommendations.

Learning Customer Preferences from Personalized Assortments

We propose a selection methodology of that the the recommended items are required to have a certain degree of diversity for revenue, surplus, consumer experience, and enhancing the benefit of risk pooling. We conduct experiments on a real-world dataset from a third-party remanufacturer and show the practicality of our framework.
A company wishes to identify the most popular version of a product from a menu of alternative options. We study how to dynamically individualize the set of versions shown to each customer, so that the company can learn from customer choices at the fastest speed.

### 093-2087 Multinomial Logit Contextual Bandits for Dynamic Assortment Selection

Min-hwan Oh, Student, Columbia University, United States
Garud Iyengar, Professor, Columbia University, United States

We study a dynamic assortment selection problem where the seller offers an assortment of products whose features as well as customer contexts are known. We propose a method which simultaneously optimizes assortment selections balancing between exploration and exploitation and learns customer’s preference. We show our proposed method achieves near-optimal regret.

### 093-0402 Deep Learning of Big Data and Field Experiment: Analytics for Customer Selection and Campaign Targeting

Kunpeng Zhang, Assistant Professor, University of Maryland, United States
Xueming Luo, Professor, Temple University, United States

Firms seek to better understand heterogeneity in the customer response to marketing campaigns which can boost campaign targeting effectiveness. This paper integrates deep-learning algorithms, big data analytics, and field experiment response heterogeneity to enhance campaign targeting effectiveness.

### 093-0899 Multi-Dimensional Observational Learning in Social Networks

Liangfei Qiu, Assistant Professor, University of Florida, United States
Arumina Chhikara, Student, University of Florida, United States
Asov Vakharia, Professor, University of Florida, United States

The prevalence of consumers sharing their purchases on social media platforms (e.g., Instagram) and the use of this information by potential future consumers have substantial implications for online retailing. We examine how product characteristics and the type of information provider jointly moderate the purchase decision in a social network setting.

### 093-1740 Bias, Blindness, and Bursted Bubble: Examination of Public Sentiment on Twitter

Daniel Kim, Student, George Washington University, United States
Yixin Lu, Assistant Professor, George Washington University, United States

We study the variation of public sentiment on two major public events: 2016 US Presidential election and the more recent Facebook-Cambridge Analytica data scandal. Despite the differences in the nature of the two events, we find the general patterns of bias and blindness among Twitter users are quite consistent.

### 093-1933 Maximizing Clicks in a Budget Constrained Ad-Campaign

Zhen Sun, Assistant Professor, The George Washington University, United States
Abhijeet Ghoshal, Assistant Professor, University of Wisconsin-Milwaukee, United States
Radha Mookerjee, Assistant Professor, University of Texas Dallas, United States

We develop a policy for an ad-campaign run by a demand side intermediary (aggregator) that maximizes the expected number of clicks while meeting advertiser's impression requirements and without exceeding the aggregator's budget. We demonstrate the optimality of the solution and also establish that it is a static policy.

### 093-0750 How to Handle Time-Critical Warehouse Orders?

René De Koster, Professor, Rotterdam School of Management, Netherlands
Felix Weidinger, Student, Friedrich-Schiller Universität Jena, Germany
Nils Boysen, Professor, Friedrich-Schiller Universität Jena, Germany

E-commerce fulfillment companies offer customers timed same-day deliveries. We develop a model, for real-time milkrun batch picking processes, followed by sorting and packing by order, with the objective to minimize order lateness and picking costs. We solve the offline integrated model heuristically and then solve and evaluate the online model.

### 093-0263 Management and Design of Robotic Sorting Systems

Bipan Zou, Assistant Professor, School of Business Administration, China
Yeming Gong, Professor, Business School, France
René De Koster, Professor, Rotterdam School of Management, Netherlands

E-commerce fulfillment operations require rapid sorting solutions for parcels in hubs. Robotic sorting is a new method to sort parcels cheaply on a very small footprint. We discuss new models that may help to optimally design such systems for cost and performance, as well as to evaluate different operational policies.

### 093-2066 Online Linear Programming with Production Costs

Michael Fairley, Student, Department of Management Science and Engineering, Stanford University, United States
Xiaocheng Li, Student, Department of Management Science and Engineering, Stanford University, United States
We consider a sequential decision-making problem where a sequence of orders arrive and we must decide to accept or decline the order before the next order is revealed. The problem provides both quantitative and qualitative insights for shipping pricing and warehouse management.

**Invited Session: Tutorial: What OM researchers should know about Blockchain technology**

**Details:**
- **Chair(s):** Volodymyr Babich
- **Title:** What OM Researchers Should Know About Blockchain Technology
- **Abstract:** Blockchain has grown in prominence, but its full potential and the downsides are not fully understood yet, especially with respect to Operations Management. After reviewing the technical foundations, we explore multiple business and policy aspects. We identify key strengths and main weaknesses and discuss research themes of applying Blockchain technology to OM.

**Contributed Session: Innovation, Learning, and Capabilities**

**Details:**
- **Chair(s):** HINA MUNIR
- **Title:** Technology and Routine Learning in High-Tech After-Sales Services
- **Authors:** Fêdde Zijlstra, Student, Eindhoven University of Technology, Netherlands
  - Alex Alblas, Assistant Professor, Eindhoven University of Technology, Netherlands
  - Fred Langerak, Professor, Eindhoven University of Technology, Netherlands
- **Abstract:** Firms learn from after-sales services. The question is, how? Based on 10 years of field data from a high-tech firm we demonstrate that technology and routine-based learning takes place on both the machine and service office level. These findings contribute to a better understanding of learning in after-sales services.

**Main Session: Developing Capabilities Along the Value Chain to Sustain Innovations in Emerging Markets**

**Details:**
- **Authors:** Anshuman Tripathy, Associate Professor, Indian Institute of Management Bangalore, India
  - Shikha Safaya, Post Doc/Researcher, Indian Institute of Management Bangalore, India
- **Abstract:** We observe that sustaining non-proprietary technological innovations in emerging markets is difficult due to resource constraints and poor delivery and logistics mechanisms. Through detailed case studies of three firms, we observe that these firms needed to grow along the value to achieve sustainable business models needing to develop new capabilities.

**Invited Session: Healthcare Analytics in Resource-limited Settings**

**Details:**
- **Chair(s):** Can Zhang
- **Title:** Risk Stratification Models for Community-Based Screening of Diabetes and Hypertension in Low-Resource Settings
- **Authors:** Justin Boutilier, Post Doc/Researcher, Massachusetts Institute of Technology, United States
  - Timothy Chan, Associate Professor, University of Toronto, Canada
  - Sarang Deo, Associate Professor, Indian School of Business, India
  - Manish Ranjan, CEO, NanoHealth, India
- **Abstract:** In this paper, we develop machine learning-based risk stratification models that are tailored for community-based screening programs in low-resource settings. We use real data collected by community health workers in India to demonstrate that our models can significantly improve risk stratification accuracy, program yield, and cost-effectiveness for diabetes and hypertension.

**Contributed Session: Cost Prediction Model of Healthcare Service System**

**Details:**
- **Author:** Sangoh Shim, Associate Professor, Hanbat National University, South Korea
- **Title:** Cost Prediction Model of Healthcare Service System
- **Abstract:** In this paper, we develop machine learning-based risk stratification models that are tailored for community-based screening programs in low-resource settings. We use real data collected by community health workers in India to demonstrate that our models can significantly improve risk stratification accuracy, program yield, and cost-effectiveness for diabetes and hypertension.
A model for predicting cost of healthcare management and a concept of design of an integrated healthcare system for remote collaboration are developed. The cost model is based on the prediction of utilization and attendant costs by using a stochastic model and system design that shows a remote collaboration under a clouding environment.

093-2219 Resource Allocation for Hepatitis C Elimination
Qiushi Chen, Assistant Professor, Penn State University University Park, United States
Turgay Ayer, Associate Professor, Georgia Tech, United States
Jagpreet Chhatwal, Assistant Professor, Harvard University, United States

Despite the recent availability of new antiviral treatment, Hepatitis C elimination remains challenging due to high treatment cost and unawareness of infection. With an analytical infectious disease model, we study optimal allocation of resources to scale-up screening and treatment that can achieve the World Health Organization's elimination goal by 2030.

093-1443 Prioritizing Hepatitis C Treatment in US Prisons
Turgay Ayer, Associate Professor, Georgia Tech, United States
Can Zhang, Assistant Professor, Duke University Durham, United States
Anthony Bonfante, Student, Georgia Institute of Technology, United States
Anne Spaulding, Associate Professor, Emory University, United States
Jagpreet Chhatwal, Assistant Professor, Harvard University, United States

Prison systems offer a unique opportunity to control the HCV epidemic because of the high concentration of the disease among the prison population. However, providing treatment to all inmates is prohibitively expensive. In this study, we propose a restless bandit modeling framework to support HCV treatment prioritization decisions in prison systems.

093-2387 A Network-Based Formulation for Scheduling Clinical Rotations
Andre Cire, Assistant Professor, University of Toronto, Canada
Adam Diamant, Assistant Professor, York University, Canada
Tallys Yunes, Associate Professor, University of Miami, United States
Alejandro Carrasco, ,

We investigate the practices of a medical school that must assign a cohort of students to a series of clinical rotations. We propose a network-flow model that leverages the structure of the data to compactly represent feasible schedules. Our analysis indicates significant cost reductions in comparison to current scheduling policies.

093-2388 Machine Learning For Predicting Heart Failure Readmission
Sauleh Siddiqui, Assistant Professor, Johns Hopkins University, United States

Predicting risk of heart failure (HF) readmission has gained increasing attention, with existing studies mainly using administrative data. We will focus on using clinical data from EMR for predicting HF readmission by doing pattern recognition with time series clinical data.

093-2389 Dynamic Resource Allocation in an Emergency Department: A Queueing Model with Time-Varying Arrival
Nilay Argon, Associate Professor, University of North Carolina Chapel Hill, United States
Serhan Ziya, Associate Professor, University of North Carolina Chapel Hill, United States
Yunan Liu, Professor, North Carolina State University, United States
Ling Zhang, Student, North Carolina State University, United States

Motivated by daily operations in a hospital emergency department, we study a multi-server tandem queueing system. We are interested in the optimal allocation of resources among patients at different stages of service. We solve an optimal control problem to minimize the overall operational costs.

093-2390 Flexible Designs for Off-Placing Patients in In-Patient Wards
Carri Chan, Associate Professor, Columbia University, United States
Bahram Javadi, Assistant Professor, University of Toronto, Canada

A common practice in hospitals is the off-placement of admitted emergency department (ED) patients to a non-primary in-patient ward (IW) when the primary ward is at full capacity. We evaluate and compare the performance of practical flexible designs for routing patients from the ED to IW by analyzing queueing models.

093-1294 A Multi-Period Vehicle Routing Problem with Service Priority Solution for Community Health Clinics
Olavo Diogo, Student, Coppead Graduate Business School, Brazil
Eduardo de Vargas, Assistant Professor, Coppead Graduate School of Business, Brazil
Peter Wanke, Associate Professor, Coppead Graduate School of Business, Brazil

The article describes the problem of routing and scheduling health teams of a community clinic over a service territory after the districting problem has been addressed. A solution based on Multi-Period VRP with Service Priority is suggested for the case of Community Clinics.
We study an online advance scheduling problem with reward and service time heterogeneity and budgeted overtime in which patients arrive one by one. By solving an online LP, we design online optimization algorithms and prove a worst-case performance guarantee. A case study of outpatient clinic scheduling is conducted.

A qualitative assessment was performed to better understand the barriers patients face on arriving to their appointment on time. The survey included questions to identify patients': 1) understanding of "appointment time" concept, 2) perceived historical arrival pattern, and 3) intention for arrival in future.

In view of the poor prediction accuracy and stability caused by the complexity of both linear and non-linear characteristics of hospital daily outpatient visits, this study constructs a combination model applied entropy method. This binary model improves validity of forecasting by taking the advantages of both SARIMA and BPNN.

A set of decisions have to be made in SC design which are very interrelated. Three approaches of making choices and analyzing interdependency patterns are: integral, modular, and open innovation. Two contextual variables are noted to examine the moderating effect on ambidexterity: environmental uncertainty and cognitive ability using an NK.

The paper investigates the relationship between the geographic localization of the supply network and the retail chain of 11 multinationals in the fashion and textile industry. We propose a framework to analyze suppliers' and retailers' geographical distributions relying on three indicators: network size, networks' relative proximity, and their spatial concentration.

Using design science method, we propose a solution that integrates social and technical components of network design. The generic design of the study is a hierarchical model that enhances decision-making through better risk management while considering complex cost-service trade-offs.

Recovery of primary roads accelerates relief distribution in disasters. In this paper, three interconnected models are proposed for damage assessment and recovery of primary roads in a way to maximize the speed of relief distribution. The models are tested for a road network in the southeast coast of the US.

We study a supply chain with one supplier and one retailer. The supplier sets the wholesale price to maximize her profit, whereas the retailer decides the order quantity to maximize his ability to reach a target profit. We investigate how the retailer's target-oriented preference affects the supply chain performance.

We study a supply chain with one supplier and one retailer. The supplier sets the wholesale price to maximize her profit, whereas the retailer decides the order quantity to maximize his ability to reach a target profit. We investigate how the retailer’s target-oriented preference affects the supply chain performance.
We study contracting for a three-tier supply chain consisting of buyer, supplier, and sub-supplier where disruptions of random length occur at sub-supplier. We study how buyer and supplier can guarantee that correct level of emergency capacity is reserved when the buyer has limited supply chain visibility beyond supplier.

We use subordinated Markov chains to model the probability of the correlated risk of disruptions in the facility location problem. We construct algorithms to calibrate and optimize the model for high-dimensional systems using fewer parameters. This approach with contrasts existent methods assume simpler models for joint disruption probabilities.

The market. We explore how a firm responds to a rival's new product preannouncement. Capitalizing on the awareness-motivation-capability and competitive dynamics literatures, we explore how organizational and supply chain factors influence a firm's response strategy. We test our theoretical model by using 3 behavioral experiments.

This paper studies a manufacturer's optimal decisions on trade promotion and product line design when the manufacturer sells through an independent retailer to uncertain market. The two major types of trade promotion, off-invoice and scan-back, are taken into consideration. We show that, when consumers have discrete demand uncertainty, a manufacturer

We study the topic area of supply chain risk management by addressing the lack of a clearly defined and unified approach to accounting for human risk behavior in supply chain risk management studies.

Small networks emerge in environments characterized by performance pressures or idiosyncratic leadership. They use information as currency of exchange to evolve routines, rituals, and boundaries. Using multiple case study, I study their morphological progression and show that such networks can be instrumental to securing an organization's purpose and/or its key assets.

We develop a game-theoretic model where multiple sellers compete on a retail platform. We find that the platform always has incentives to share the information. We characterize the optimal information sharing strategy under different practical constraints.

Classic Vendor Managed Inventory agreements render communication of demand signals and lost-sales information between participating firms as non-credible, leading parties to abolish such agreements. We propose a dynamic learn-and-screen mechanism to better manage VMI agreements. Inventory decisions in this mechanism serve a strategic purpose and satisfy customer demand.

Financial Cross-Ownership and Information Dissemination in a Supply-Chain

Noam Shamir, Assistant Professor, Tel Aviv University, Israel
Yossi Aviv, Professor, Washington University St Louis, United States
Financial cross-ownership describes a situation in which one company has stocks of its rival. We examine the way this investment tool affects the incentives to acquire demand information and the competition level in the market.

093-1179 Supplier Audit Information Sharing and Responsible Sourcing
Albert Ha, Professor, Hong Kong University of Science and Technology, Hong Kong
Weixin Shang, Associate Professor, Lingnan Univ, Hong Kong
Yunjie Wang, Assistant Professor, Renmin University of China, China
We study the incentive for competing manufacturers to share supplier audit information in a market with some consumers who boycott a manufacturer if supplier responsibility violations occur. We characterize the manufacturers' equilibrium audit information sharing decisions and sourcing strategies, and show how they depend on the model parameters.

093-2072 Operational Efficiency, Cybersecurity Investment, and Information Sharing Among Competing Firms
Hyoduk Shin, Associate Professor, University of California San Diego, United States
Noam Shamir, Assistant Professor, Tel Aviv University, Israel
In response to the recent cyber-attacks on Home Depot and Target, legislative efforts have been underway, encouraging (but, not requiring) information sharing on such threats. One hurdle is that companies raise competitive concerns about pooling cyber threat information. We explore different information sharing policies and its ramifications on cyber attacks.

093-0895 Asymptotic Optimality in Lost Sales Inventory Systems: Projected Inventory Level Policies
Willem Jaarsveld, Van, Assistant Professor, Eindhoven University of Technology, Netherlands
Joachim Arts, Associate Professor, University of Luxembourg, Luxembourg
We consider the canonical periodic review lost sales' inventory system with positive lead-times and stochastic i.i.d. demand. We introduce a new policy that places orders such that the expected inventory level at the time of arrival of an order is at a fixed level and study its asymptotic optimality.

093-1031 Safety Stock Placement in Dual-Sourced Supply Chains: A Successive Approximation Approach
Stefan Minner, Professor, Technische Universität München, Germany
We present an extension of the guaranteed service approach to safety stock placement in supply chains including multiple sourcing options and service level constraints. We present a new solution approach based on linear programming with successive approximation and performance guaranteed.

093-1057 Spare Parts Management Under Double Demand Uncertainty
Geert-Jan Van Houtum, Professor, Eindhoven University of Technology, Netherlands
Tarkan Tan, Associate Professor, Technische Universiteit Eindhoven, Netherlands
Erwin Wingerden, Student, Technische Universiteit Eindhoven, Netherlands
We consider the spare parts inventory control during the first years of the exploitation phase of capital goods. For a single location, multi-item inventory problem with Poisson demand processes and uncertainty in the estimated demand rates, we show the effect of the uncertainty on the optimal policy and costs.

093-1217 Inventory Control in Distribution Systems With Quantity Based Shipment Consolidation
Johan Marklund, Professor, Lund University, Sweden
Filip Malmberg, Student, Lund University, Sweden
We consider a centralized one-warehouse-multiple-retailer inventory system with quantity based shipment consolidation to groups of non-identical retailers facing Poisson demand. For this system, we present an exact method for determining the inventory level distributions at all stock-points, the expected inventory and shipment costs, fill rates, and transport emissions.

093-0769 Bundle Pricing of Congested Services
Chenguang Wu, Assistant Professor, Hong Kong University of Science and Technology, Hong Kong
Luyi Yang, Assistant Professor, Johns Hopkins University, United States
This paper studies whether a service firm (e.g., an amusement park) should sell all its congested services (e.g., rides) as a bundle (bundle pricing) or separately (à la carte pricing). We show how the presence of congestion-driven delay in service systems alters the prescriptive guidance from the product bundling literature.

093-1496 Strategic Decisions in Systems with Batch Arrivals
Olga Bountali, Assistant Professor, University of Toronto, Canada
Apostolos Burnetas, Professor, National and Kapodistrian University of Athens, Greece
Lerzan Ormeci, Associate Professor, Koç University, Turkey
Customers in batch-arrival systems vacillate upon the "join-balk" dilemma: should each member decide under the objective of maximizing his individual revenue or should they all aim to maximize the batch welfare? We consider a Markovian queue and address the question above under two decision frameworks.
093-0452  Dueling Crowdsourcing Contests  
Konstantinos Stouras, 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  
The design of sourcing a task to the crowd is not only affected by the choices of the designer, but it is also impacted by the choices of any other competing designers that organize contests in parallel. We study equilibria among mechanisms and discuss implications for service operations.

105  Friday, 01:45 PM - 03:15 PM, Monroe  Track: Humanitarian Operations and Crisis Management  
Invited Session: Tutorial on Humanitarian Operations  
Chair(s): Maria Besiou  Erica Gralla  
093-2412  Tutorial on Humanitarian Operations  
Maria Besiou, Professor, Kuehne Logistics University, Germany  
Erica Gralla, Assistant Professor, George Washington University, United States  
Humanitarian organizations reached an unprecedented number of 92.8 million people in need in 2016. While humanitarian operations in response to emergencies and development needs increase, so does research in areas. In this tutorial we discuss the evolution of humanitarian operations research along with areas that are less explored.

106  Friday, 01:45 PM - 03:15 PM, Lincoln East  Track: Humanitarian Operations and Crisis Management  
Contributed Session: Understanding Humanitarian Supply Chains  
Chair(s): Muhammad Azmat  
093-0046  The Role of Risk and Resilience in Humanitarian Supply Chains: A Qualitative Study  
Luai Jraisat, Senior Lecturer, University of Northampton.ac.uk, United Kingdom  
The study examines the role of risk and resilience in humanitarian supply chains. This follows an abductive approach where Transaction Cost Economics (TCE) is used to guide data collection and analysis, and semi-structure interviews within a qualitative study are conducted to provide key insights for researchers and policy makers.

093-0195  Post-Disaster Humanitarian Logistics Planning: A Time-to-Survive Framework  
Yini Gao, Assistant Professor, Singapore Management University, Singapore  
Guodong Lyu, Student, National University of Singapore, Singapore  
We consider the post-disaster relief resource logistic planning problem with uncertainties in the transportation capacities and demands. We propose to use Time-to-Survive as a performance measure for relief effort and adopt a two-stage distributionally robust approach to determine the optimal transportation plan, which can be solved by a SDP problem.

093-0458  Locating Drone-Based Stations for Disaster Recovery  
Cihan Tugrul Cicek, Student, University of California Berkeley, United States  
Zuo-Jun Max Shen, Professor, University of California Berkeley, United States  
Disaster recovery work demands facing challenging situations and environments. A new location problem for drone base stations (DBSs) have been introduced to help speed recovery work in telecommunication. Due to rapid deployment and mobility property, DBSs can significantly increase the efficiency in management of post-disaster operations by providing wireless communication.

093-0380  Identification of Critical Success Factors (CSF) in Faith Based Humanitarian Organizations’ Supply Chain  
Muhammad Azmat, Student, Vienna Univ of Econ & Business Admin, Austria  
Maria Besiou, Professor, Kuehne Logistics University, Germany  
Sebastian Kummer, Professor, Vienna Univ of Econ & Business Admin, Austria  
An aid organization’s supply chain needs to have an end to end synchronization in order to facilitate the beneficiaries, but this synchronization can be disrupted by religious values. This empirically evident exploratory research investigates the magnitude of disruption caused by religious involvement and supply chain differences of different humanitarian organizations globally.

107  Friday, 01:45 PM - 03:15 PM, Lincoln West  Track: Empirical Research in Operations Management  
Invited Session: Empirical Research in Revenue Management and Pricing  
Chair(s): Ovunc Yilmaz  
093-0333  Dynamic Pricing and Transparency in On-Demand Services  
Ryan Buell, Associate Professor, Harvard Business School, United States  
Nil Karacaoglu, Student, Kellogg School of Management, United States  
Antonio Moreno, Associate Professor, Harvard University, United States  
The design of sourcing a task to the crowd is not only affected by the choices of the designer, but it is also impacted by the choices of any other competing designers that organize contests in parallel. We study equilibria among mechanisms and discuss implications for service operations.
On-demand services adopt dynamic pricing practices to match supply and demand. We investigate how customers perceive the trade-offs between increased prices, waiting time, and unavailability. Furthermore, we examine how operational transparency can influence customers' fairness perception and satisfaction in the context of dynamic pricing. We adopt theories on fairness perceptions.

In this study, we empirically explore how consumers choose different payment modes when booking hotel rooms and strategically cancel their bookings from transaction data of a large Online Travel Agency in China. We find that strategic consumers will keep monitoring price fluctuations and then decide whether they should cancel.

We construct an optimization based ticket trading strategy that a major secondary ticket reseller is piloting as well as a novel method for heterogeneous treatment effect estimation for classification. Trading on NBA ticket listings, our approach yields a seller's revenue up to $9.6 million for a single season.

Using the ticket sale data of a college football team, we investigate how fans make their decisions in different channels (i.e., season tickets and single-game tickets) and provide important insights for pricing.

This session presents various operational challenges, solutions and innovations observed by practice leaders in sustainability, supply chain, and management consulting respectively. Their views open up research opportunities for OM researchers.

Disruptive events expose projects to unforeseen risks and impacts performance. To measure project resilience, project characteristics such as activities' resourcefulness with scheduling constraints, suppliers' and contractors' performance are considered. The approach is presented via construction project case and network resilience score is computed to predict project performance.

Contractors are expected to enhance the project performance through effective contract management. In this paper, factors imparting resilience capabilities in contractors are identified to combat risks. A case study is also presented from the construction sector wherein the identified resilience capabilities of associated contractors are assessed.

So far, supply chain resilience has been mainly investigated at the firm and the supply chain level, but relatively little is known about the role of HR skills in this context. We identify and empirically test personality characteristics and capabilities that enable decision makers to cope with supply chain disruptions.
Friday, 01:45 PM - 03:15 PM

093-0288 Supply Chain Resilience: Theoretical Construct and Measurement Development

Chunsheng Li, Student, Hong Kong Polytechnic Univ, Hong Kong
Christina Wong, Associate Professor, The Hong Kong Polytechnic University, Hong Kong
Chee Wong, Professor, Leeds University, United Kingdom
Sakun Boon-Itt, Associate Professor, Thammasat University, Thailand

This study conceptualized supply chain resilience in the risk management context and developed a measurement model based on Porter’s Value Chain. Validated through a multi-method research, the measurement scales provide a useful reference for firms to evaluate their supply chain resilience efforts and identify areas of improvement.

093-0028 Category Captainship in the Presence of Retail Competition

Alper Nakkas, Assistant Professor, The University of Texas at Arlington, United States
Yasin Alan, Assistant Professor, Vanderbilt University, United States
Mumin Kurtulus, Associate Professor, Vanderbilt University, United States

Category Captainship (CC) is a retailing practice in which a retailer delegates some category management decisions to a manufacturer. We analytically examine the operational implications of CC in the presence of retail competition. Our study leads to novel insights into the impact of CC on retailers, manufacturers, and consumers.

093-0175 Data-Driven Reoptimization Approaches for the Stochastic Commodity Warehouse Problem

Christian Mandl, Student, Technische Universität München, Germany
Selvaprabhu Nadarajah, Assistant Professor, University of Illinois at Chicago, United States
Stefan Minner, Professor, Technische Universität München, Germany
Srinagesh Gavirneni, Professor, Cornell University, United States

We present different non-parametric and machine learning-inspired data-driven approaches to solve the Stochastic Commodity Warehouse Problem, which is the fundamental problem in inventory trading and merchant operations within volatile commodity markets. Furthermore, we compare the solution methods based on real commodity price data from 2000 to 2017.

093-0536 Managing Reputation Risk in Supply Chains

Vibhuti Dhingra, Student, University of British Columbia, Canada
Harish Krishnan, Professor, University of British Columbia, Canada

When a supplier fails to comply with social and environmental standards, the buyer’s reputation suffers. We study the role of a risk-sharing contract in managing this reputation risk. We find that risk-sharing can both decrease and increase supplier violations, and we show that the buyer can benefit in each case.

093-0864 Buyer Finance, Supply Risk, and Extended Payments

Mohamed Ali Mansour, Post Doc/Researcher, Concordia University, Canada
Xiaoyan Huang, Associate Professor, Concordia University, Canada
Vincent Hovelaque, Professor, IGR-IAE de Rennes, Université de Rennes 1, France
Jean-Laurent Viviani, Professor, IGR-IAE de Rennes, Université de Rennes 1, France

We consider a large buyer procuring from a risky and capital-constrained supplier under wholesale price contract. The buyer may offer finance to the supplier, and in return, request the remaining balance be paid on an extended term. We characterize the optimal design of the wholesale contract and the financing scheme.

093-2208 Action Learning in Operations and Supply Chain Management

Stanley Fawcett, Professor, Weber State University, United States
Amydee Fawcett, Assistant Professor, Weber State University, United States

Collaborative action learning promises to: • Enhance student engagement • Improve learning outcomes • Get better teaching evaluations • Have more fun in the classroom In this session, we will demonstrate a range of action-learning activities from the use of metaphors and object lessons to think-pair-share activities to real-time games.

093-0535 Pedagogy in POM Using New Technologies and Concepts

Kaushik Sengupta, Professor, Hofstra University, United States

POM teaching has evolved through the years in terms of topics and technologies. We discuss how the use of technologies has changed our teaching and how new conceptual areas have evolved as core discussion areas. Emerging topics like Blockchain, Humanitarian Supply Chains etc., will be included in discussions.

093-0651 Experiential Undergraduate Operations Management Course Engages Students

Julia Miyaoaka, Professor, San Francisco State University, United States
Leyla Ozen, Associate Professor, San Francisco State University, United States
Yabing Zhao, Assistant Professor, San Francisco State University, United States
Ardavan Asef-Vaziri, Professor, California State University Northridge, United States

We describe an experiential operations management course for undergraduate business students that includes computer labs and “hands-on” group activities. We find that this format of the course engages students while improving student performance compared to that of traditional lectures.

093-1019  Reducing Waste by Learning from Environmental Inspections: Empirical Evidence from Unconventional Wells in Pennsylvania
Vidy Mani, Assistant Professor, Penn State University University Park, United States
Suresh Muthulingam, Assistant Professor, Penn State University University Park, United States

We examine whether manufacturing units learn to reduce waste when they gain experience with environmental inspections. Specifically, we explore how different facets of inspection experience gained either directly at a manufacturing unit or vicariously at other manufacturing units support waste reduction.

093-1431  Is Sharing Economy Green?
Paolo Letizia, Assistant Professor, University of Tennessee Knoxville, United States
Paolo Roma, Assistant Professor, Universita Degli Studi Di Palermo, Italy
Fahimeh Rahmanniyay, Student, University of Tennessee Knoxville, United States

We study the environmental impact of sharing economy by considering the different incentives of a product manufacturer, sharing platform, consumers, and peer-to-peer providers. The main trade-off is between the production of less products by the manufacturer and the higher utilization of the shared products by the consumers.

093-1921  Volunteer Management: Job Design and Work Allocation
Baris Ata, Professor, University of Chicago, United States
Joy Field, Associate Professor, Boston College, United States
Deishin Lee, Associate Professor, Ivey Business School, Western University, Canada
Mustafa Tonglarak, Assistant Professor, Bogazici University, Turkey

We study how non-profit organizations can design jobs and allocate jobs to volunteers to increase their social impact.

093-2213  Positive Externalities of E-Waste Laws: Quasi-Experimental Evidence from California and Florida
Suvrat Dhanorkar, Assistant Professor, Penn State University State College, United States
Suresh Muthulingam, Associate Professor, Penn State University University Park, United States

We investigate the positive externalities of e-waste legislation on broader disposal behaviors using a quasi-experimental setup.

093-0523  Inventory Dispersion in a Sequential Inventory System with Demand Forecast Evolution
Isik Bicer, Assistant Professor, Erasmus University Rotterdam, Netherlands
Florian Lucker, Assistant Professor, Cass Business School, United Kingdom

We develop a dynamic-optimization model to optimize the order quantities in a multi-echelon setting with demand-forecast evolution. Using our generalized optimization model, we compare lead-time-reduction and process-redesign strategies that were investigated in isolation in the literature. We then develop a decision typology showing effective practical approaches to mitigate supply-demand mismatches.

093-1793  A Non-Parametric Approach for Setting Safety Stocks for a Continuous Review Inventory Policy
John Saldanha, Associate Professor, John Chambers College of Business & Econ, United States
Brad Price, Assistant Professor, West Virginia University, United States
Doug Thomas, Professor, University of Virginia, United States

We propose a bootstrap algorithm as a non-parametric approach to calculate statistically sound estimates for setting inventory policies directly from lead time and demand data. We offer theoretically-grounded guidance on bootstrap inputs that yield the least biased estimates. Results from numerical experiments and an industry application indicate promising results.

093-2032  Inventory Control for Items with Extremely Intermittent Demand
Marco Bijvank, Assistant Professor, University of Calgary, Canada

A manufacturer of Flexible Intermediate Bulk Containers changed their supply chain strategy from make-to-order to make-to-stock. However, their customers order very infrequently and in large quantities. We study replenishment policies for items with such intermittent demand characteristics where traditional approaches (such as the Croston method) do not work.
What Prevents the Application of Inventory Theory in Practice?

Sean Willems, Professor, University of Tennessee Knoxville, United States

My talk will draw on many real-world implementations where I can share before and after data, make clear what academic assumptions needed modification, and present several cases where practitioners would not implement our academic models. I will define the important dimensions many academic models are missing.
Aydin Alptekinoglu, Associate Professor, Penn State University University Park, United States
Punya Chatterjee, Student, Penn State University State College, United States

Should Omnichannel Retailers Allow In-Store Returns of Online Purchases?

To boost sales, retailers may use incentive mechanisms to attract customers to return online purchases in stores. This practice enhances the sales of returnable products and ranks these products higher in their online platform. However, this policy may also encourage some customers to return authentic products to earn returns in exchange for new products. This paper explores the complexities by investigating the equilibrium outcomes for both consumers and retailers. We find that, for retailers, there are two types of equilibrium strategies: the dishonest strategy, which misleads the consumer, and the honest strategy, which does not manipulate the consumer. The dishonest strategy is more profitable in low-turnover industries, whereas the honest strategy is beneficial in high-turnover industries. The study also reveals that this policy promotes product manipulation, which may lead to adverse consumer behavior and possibly result in market failures.

We analyze the warranty matching problem that emerges in a closed-loop supply chain. In our setting, there are two warranties in place: the customer warranty and an OEM warranty. We introduce and evaluate three matching strategies to reduce mismatch costs resulting from the misalignment between customer warranty and OEM warranty. The first strategy is a simple deterministic strategy, whereas the second strategy uses a VAR(1) model to estimate the returns. The third strategy uses a comprehensive two-period model addressing information, return policies, trade-in rebates, and product generations, we identify the optimal conditions for the seller to choose remanufacturing, open-box sales, or salvaging, when faced with false-failure returns from strategic consumers. We also investigate implications of consumer moral hazard and implications on sustainability performance.

We investigate the dynamics of a closed-loop supply chain with VAR(1) demand and return processes. It is shown that the manufacturing cost is convex in the yield rate at the remanufacturer, which is an undesirable characteristic from a sustainability viewpoint. We consider replenishment policies that overcome this issue.

Forward cycle time distributions for returnable transport items are developed for periods with incomplete data, and these distributions are utilized to create an estimate of future container returns. The method used to estimate distributions employs an adaptive exponential smoothing method that accounts for seasonality to forecast the parameters.

We consider a retailer selling products in two periods: the normal selling season and the clearance season in which the remaining products are auctioned off. We study the retailer's optimal pricing strategy and auction design, by characterizing consumers' trade-off between buying at the guaranteed price and entering the auction.

We use a unique data set from a Chinese online retailer to empirically study the impacts of a free shipping threshold on consumer shopping behaviors in different channels.

In this paper, we consider a firm's decision on innovative technology adoption. We first characterize the optimal timing of technology adoption and then we study the incentive wage contract to motivate employees to use the new technology.

This paper studies a growing practice on major e-commerce platforms (such as Alibaba and JD.com) called "brushing", whereby sellers place fake orders of their own products to inflate sales and boost rankings.

Punya Chatterjee, Student, Penn State University State College, United States
Aydin Alptekinoglu, Associate Professor, Penn State University University Park, United States
We investigate when an omnichannel retailer should allow in-store returns of online purchases. The retailer has two substitutable products to offer, both available online, that differ by the uncertainty consumers have over their valuation. The retailer sets prices and store assortment in addition to the store return policy.

### Big Data in Agricultural Management

**Contributed Session: Big Data in Agricultural Management**

**Chair(s):** Namibirajan Thangasamy

**093-0207** Big Data Innovation for Agritech Businesses: Knowledge Transfer Adaptation Model for AI Collective Knowledge

- Tetsuro Goto, Post Doc/Researcher, Hosei University, Japan
- Haruo Horaguchi, Professor, Hosei University, Japan

Agricultural operations management is led by technological innovation using big data for AI. An agritech information provider gathers information by sensing nitrogen, temperature, humidity, etc., to fertilize the crop and paddy fields, to make seedling prescription, and to spray pesticides. Decision making is optimized for farmers.

**093-0337** Industry 4.0 Applications in Agriculture: Cyber-Physical Agricultural Systems (CPAS)

- Rohit Sharma, Student, National Institute of Industrial Engineering, Mumbai, India
- Anjali Shishodia, Student, NITTIE, Mumbai, India

In this data driven era, the future of agriculture seems optimistic with the application of Industry 4.0 technologies such as CPS, IoS, IoT, Blockchain, Cloud Computing and Big Data. This paper highlights a framework depicting Cyber Physical Agricultural Systems (CPAS) which will enhance the agricultural productivity and decision-making.

**093-1854** System and Capability Approach to Enhance Farmers’ Agribusiness Growth: Study Using Exploratory Factor Analysis

- S Madhiyarsi, Student, Pondicherry University, India
- Namibirajan Thangasamy, Professor, Pondicherry University, India

This research work starts from research background that provides the urgency and needs to take up farmers’ agri-business as a subject area in order to enhance agri-business performance and growth. Quantitative and qualitative data are presented, evaluated, and analyzed. Exploratory factor analysis is used to evaluate and analyze data.

### Case Studies in Public Sector Operations Management

**Contributed Session: Case Studies in Public Sector Operations Management**

**Chair(s):** Saulo Amâncio-Vieira

**093-0701** Effects of Delays in Public Building Projects in Ghana

- Ebenezer Adaku, Senior Lecturer, GIMPA, Ghana
- Yakub Alhassan, Student, GIMPA, Ghana
- Richard Ohene Asiedu, Lecturer, GIMPA, Ghana
- Samuel Famiyeh, Associate Professor, GIMPA, Ghana

Developing countries face fiscal challenges. However, in the midst of the fiscal challenges is the endemic phenomenon of delays in public building projects which have consequences for the public purse. This study seeks to unravel the critical effects of delays in public building projects in Ghana for policy information.

**093-1853** Efficiency in Basic Health Units: A Case Study in a Developing Country

- Camila Ferri, Student, Londrina State University, Brazil
- Saulo Amâncio-Vieira, Professor, Londrina State University, Brazil
- Vera Suguhiro, Professor, Londrina State University, Brazil

The present study aims to analyze the efficiency of the Basic Health Units of Londrina,Brazil. This research can be classified as descriptive and quantitative. A census was carried out, raising data on the costs of each unit, as well as values related to the productivity of the servers.

**093-1862** Relationship Between Costs and Educational Performance: A Longitudinal Analysis in Brazilian Municipal Schools

- Saulo Amâncio-Vieira, Professor, Londrina State University, Brazil
- Thiago Ferreira, Professor, Londrina State University, Brazil
- Vera Suguhiro, Professor, Londrina State University, Brazil

This paper aims to analyze the evolution of the relationship between costs and performance of the municipal elementary school units of Londrina. The research is characterized as quantitative and descriptive. The evolution of the Ideb are above the average and the socioeconomic level has a strong association with the performance.

**093-1835** Implementation of the Electronic Information System (SEI): A Londrina City Hall Case Study

- Luiz Feltoza, Student, Universidade Estadual de Londrina, Brazil
- Saulo Amâncio-Vieira, Professor, Londrina State University, Brazil

This study aims to understand the history of the implementation of the Electronic Information System (SEI) occurring in the city of Londrina - PR. The research has a qualitative approach with a descriptive-exploratory character. It was concluded that the SEI approached the municipality to a more public-oriented management model.
Friday, 04:30 PM - 06:00 PM

Written Papers:

Session: Platform Operations
Chair(s): Robert Swinney, Soudipta Chakraborty

093-0595 Information Sharing on Retail Platforms
Zekun Liu, Student, Washington University St Louis, United States
Dennis Zhang, Assistant Professor, Washington University St Louis, United States
Fuqiang Zhang, Professor, Washington University St Louis, United States

This paper studies the information sharing strategy for a retail platform on which multiple competing sellers distribute their products. The platform owns superior demand information and can adopt different information sharing strategies. We investigate the platform's optimal information sharing strategy under two potential constraints, privacy and fairness.

093-2050 Relationships in Online Marketplaces
Elena Belavina, Assistant Professor, Cornell University, United States
Karan Girotra, Professor, Cornell University, United States
Ken Moon, Assistant Professor, The Wharton School, United States
Jiding Zhang, Student, The Wharton School, United States

Our study investigates trade-enhancing relationships and relationship-specific investments made by the participants in these increasingly important markets. We propose relevant methods for assessing the economic value of relationships and explore prescriptive implications for marketplace operations and design.

093-2133 Rewarding Loyalty: Bonus Schemes in the Gig-Economy
Kaitlin Daniels, Assistant Professor, Washington University St Louis, United States
Puping Jiang, Student, Washington University St Louis, United States
Fuqiang Zhang, Professor, Washington University St Louis, United States

Increasingly gig-economy platforms pay workers lump sum payments (i.e. bonuses) as a reward for completing sufficiently many services within a short timeframe (e.g. a week). We investigate the design of these bonuses.

093-0068 Designing Rewards-Based Crowdfunding Campaigns for Strategic Backers
Soudipta Chakraborty, Student, Duke University Durham, United States
Robert Swinney, Associate Professor, Duke University Durham, United States

We study a model of rewards-based crowdfunding with the all or nothing funding mechanism popularized by Kickstarter. We determine how a creator should design her campaign when the uncertainty of receiving the reward makes backers behave strategically.

Session: Production Planning and Scheduling
Chair(s): Anand Kandaswamy

093-1904 Inventory and Scheduling Policies for a Hybrid MTS-MTO Manufacturing System
Andreas Schoechtel, Manager Operations, Thermo Fisher Scientific, Germany

We investigate inventory and scheduling policies for a hybrid system which employs both Make-to-Stock (MTS) and Make-to-Order (MTO) manufacturing strategies. We use real data from a global Laboratory Equipment manufacturer. Our results show that prioritization and expediting has a substantial positive effect on company profit.

093-1151 A Hierarchical Method for Production Planning Based on Standard of Scheduled Time and Quantity
Xiaobing Liu, Professor, Faculty of Management and Economics, Dalian University of Technology, China
Xuejing Zhu, Student, Faculty of Management and Economics, Dalian University of Technology, China
Fanghong Xue, Lecturer, Faculty of Management and Economics, Dalian University of Technology, China
Lin Lin, Student, CRRC DALIAN R&D CO., LTD., China

In order to overcome the instability of production planning for complex products, we establish a data model named Standard of Scheduled Time and Quantity, and propose the mapping relationship with network planning. Then, a hierarchical network planning model was developed which improved the accuracy and feasibility of the plan.

093-2451 Predicting the Performance of Production Lines with Stochastic Learning
Thilini Ranasinghe, Professor, University of Peradeniya, Sri Lanka
C.D. Senanayake, Senior Lecturer, University of Peradeniya, Sri Lanka
Kanthi Perera, Senior Lecturer, University of Peradeniya, Sri Lanka

In this research, we develop simulation and analytical models to predict the performance of production lines subject to stochastic learning. We use empirical data collected from the apparel manufacturing industry to develop these models. We also show the impact of worker heterogeneity on the performance of these systems.

093-0735 Patents, Innovation, and Manufacturing Productivity
Anand Kandaswamy, Economist, NIST, United States
Douglas Thomas, Economist, NIST, United States

What is the relationship between innovation (as measured by patents activity) and productivity in the manufacturing context? The authors use statistical models to analyze a recent data set and present their conclusions.
### 121 Friday, 04:30 PM - 06:00 PM

**Contributed Session: Circular Economy**

**Chair(s):** Santosh Nandi

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<tr>
<td>093-0485</td>
<td>Product Recovery Decision-Making in the Context of Internet of Things: A Review and Generic Roadmap</td>
<td>Kai Meng, Post Doc/Researcher, Massachusetts Institute of Technology, United States&lt;br&gt;Xianghui (Richard) Peng, Assistant Professor, Penn State University Erie, United States&lt;br&gt;Ying Cao, Assistant Professor, Penn State University Erie, United States&lt;br&gt;Vctor Prybutok, Professor, University of North Texas, United States</td>
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</table>

We provide a state of the art review on End-of-Life (EOL) product recovery decision-making in the context of Internet of Things. We contextualize an implementation framework to enable sustainable EOL product management based on enriched information. We propose a generic roadmap for model and methodology selection to assist practitioners.

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<tr>
<td>093-0581</td>
<td>Remanufacturing of Multi-Component Systems with Product Substitution</td>
<td>Baolong Liu, Student, Arizona State University, United States&lt;br&gt;Felix Papier, Professor, Essec Business School, France</td>
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</table>

This research investigates inventory and production management of a system serving demand for new and remanufactured products and allowing for substitution between both. To minimize weighted-sum economic cost and environmental impact, we analyze single-component products, show the threshold-type optimal policies, and also analyze multi-component products and develop a close-to-optimal heuristic.

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<td>093-0920</td>
<td>Circular Economy in the Fresh Fruit Supply Chain in Brazil</td>
<td>Andre Souza, Professor, Universidade de Fortaleza, Brazil&lt;br&gt;Fernando Luiz Viana, Professor, Universidade de Fortaleza, Brazil</td>
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This paper evaluates the application of the principles of Circular Economy (eco-design, reduction, reuse, recycling, reclassification and renewal) in the fresh fruit supply chain in Brazil, which has contributed to the reduction of food waste, to improve the economic and environmental performance in supply chain firms.

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<td>093-1502</td>
<td>A Contingency Approach for Supply Chain Preparedness to Pursue Circular Economy Business Models (CEBM)</td>
<td>Santosh Nandi, Assistant Professor, University of South Carolina, United States&lt;br&gt;Hale Kaynak, Professor, University of Texas Rio Grande Valley, United States</td>
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A growing stream in circular economy research is about CEBM. However, the understanding about how firms could integrate CEBM practices with supply chain partners is limited. Given the rise in supply chain complexities, this study suggests a contingency framework about how firms’ supply chain preparedness help them in pursuing CEBM.

### 122 Friday, 04:30 PM - 06:00 PM

**Invited Session: Panel: Teaching Operational Excellence**

**Chair(s):** Torbjorn Netland, Rachna Shah

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<td>093-2396</td>
<td>Teaching Operational Excellence</td>
<td>Dan Bumblauskas, Associate Professor, University of Northern Iowa, United States&lt;br&gt;Matthias Thurer, Professor, Jinan University, China&lt;br&gt;Torbjorn Netland, Assistant Professor, Eth Zurich, Switzerland&lt;br&gt;Barry Render, Emeritus Professor, Rollins College, United States&lt;br&gt;Eric Olsen, Professor, California Polytechnic State University San Luis Obispo, United States&lt;br&gt;Aravind Chandrasekaran, Associate Professor, Ohio State University, United States</td>
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In this panel/workshop, we have invited leading OEX scholars to share their insight on how to teach operational excellence. The session covers a few practical examples and ends with a roundtable discussion.

### 123 Friday, 04:30 PM - 06:00 PM

**Invited Session: Coordination, competition and contracting**

**Chair(s):** Ryan Choi

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<tr>
<td>093-1142</td>
<td>The Direct and Indirect Effects of Cross-Functional Transactive Memory System Alignment on Supply Chain Disruptions</td>
<td>Scott Ellis, Associate Professor, Georgia Southern University, United States&lt;br&gt;Kevin Scheibe, Associate Professor, Iowa State University, United States&lt;br&gt; Jennifer Blackhurst, Professor, University of Iowa, United States</td>
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A transactive memory system (TMS) consists of three elements: actors’ specialization of knowledge, credibility or cognitive trust of actors’ knowledge, and ability to coordinate between the actors in the TMS. Using dyadic survey and matched objective data, we examine how cross-functional TMS’s mitigate the frequency and magnitude of supply disruptions.

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<td>093-1445</td>
<td>Sustainable Partnerships in Food Security and International Trade</td>
<td>Jiho Yoon, Assistant Professor, Kansas State University, United States&lt;br&gt;Sri Talluri, Professor, Michigan State University, United States</td>
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Sustainable partnerships have become key to success in sectors such as food security and international trade. We investigate how an exporting firm and an importing firm strategically coordinate a sustainable relationship.
We investigate the relationship between supply management practices and supply chain performances and provide a simple characterization of multiple-tiered suppliers’ responses to buyer’s practices in terms of the various market conditions. The paper discuss how supplier management practices should be transferred upstream (or downstream) to improve overall supply chain performance.

The share of e-commerce sales is rapidly increasing and so are the associated losses caused by website outages and slow websites. Using two different research designs – panel data with fixed effects and generalized synthetic control with elastic net – we estimate sizable adverse effects of website speed slowdowns on online sales.

We study how a multi-channel or omni-channel retailer should decide the number and size of physical stores. We also study the effect of three common omni-channel strategies: showroom stores, return flexibility, and in-store pick-up.

Using archival data, we examine the impact of an incentive change (from being purely dependent on store performance to being dependent upon both store and corporate performance) at a retail chain on stores’ financial and operational outcomes as well as some of the underlying operational decisions made by managers.

Due to China’s dispersed agricultural supply chain, regulatory agencies have complicated decisions with regard to the focus of their testing. Using data collected on China FDA food safety tests, along with other supply chain data, we used supply chain analytics to identify key risk drivers in the supply chain.

We consider the integrated optimization of key operational decisions in farm planning with uncertain farm yield and labor cost. We model this problem as a two-stage stochastic program and characterize the optimal decisions. We then examine how these uncertainties affect farm profitability and sustainability.

A commonly believed cause for the food safety problems in the developing economies is that the government's auditing system is decentralized. In this paper, we analytically investigate how agency structure and the food safety outcome interact by studying a canonical two-tier supply chain with the corresponding agencies.
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<tr>
<td>093-0196</td>
<td>Supply Chain Competition: A Market Game Approach</td>
<td>C. Gizem Korpeoglu, Assistant Professor, University College London</td>
<td>We develop a novel model of a supply chain with multiple suppliers and multiple retailers based on a market-game mechanism that captures both suppliers' seller power and retailers' buyer power. We study supply chain expansion to include more suppliers or retailers and the integration of local supply chains.</td>
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<td>093-0434</td>
<td>Price Competition Under Social Comparison and Demand Uncertainty</td>
<td>Yun Zhou, Assistant Professor, McMaster University, Canada</td>
<td>We study a price competition problem under a duopoly setting. Either of the two firms receive a positive utility if it outperforms the competitor in revenue and incurs a disutility if outperformed. We show that depending on the demand variability, the social comparison behavior may intensify or alleviate competition.</td>
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<td>093-1183</td>
<td>Long-Term Salesforce Compensation</td>
<td>Long Gao, Assistant Professor, University of California Riverside</td>
<td>We study a long-term salesforce compensation problem in a dynamic environment, where salespeople can learn from over time. We characterize the optimal compensation plan and provide new managerial recommendations.</td>
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<td>093-1072</td>
<td>To Commit or Not to Commit: Product Rollover Strategies in a Supply Chain</td>
<td>Adem Orsdemir, Assistant Professor, University of California Riverside</td>
<td>When launching products manufacturers can phase out the old generation of the product (single rollover) or can sell the old generation (dual rollover). We investigate whether manufacturers should commit to a single rollover or not. We find committing to single rollover can hurt even when a single rollover arises in equilibrium.</td>
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<td>093-0069</td>
<td>Supplier Development in a Multi-Tier Supply Chain</td>
<td>Ozgen Karaer, Assistant Professor, Middle East Technical University</td>
<td>We examine how a buyer can use a full-control strategy to develop the sustainable quality capabilities of his tier-1 and tier-2 suppliers. In particular, we consider how the buyer's and the suppliers' decisions are impacted by consumers' demand sensitivity to sustainable quality and the division of the supply chain margins.</td>
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<td>093-0278</td>
<td>Supply Chain Network Structure and Environmental Information Disclosure</td>
<td>Marcus Bellamy, Assistant Professor, Boston University, United States</td>
<td>Recognizing that supply network structure has implications for a focal firm's ability to access environmental information embedded in its supply network, this paper draws on structural, environmental, and financial data from Bloomberg to test the relationship between a focal firm's supply network structure and its extent of environmental information disclosure.</td>
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<td>093-2203</td>
<td>Offering Trade-ins for Competitor's Used Products</td>
<td>Narendra Singh, Assistant Professor, Indian School of Business, India</td>
<td>The firms increasingly offer trade-ins for their competitors' used products. While such trade-ins may allow a firm to compete more aggressively, they may also increase resale value of competitors' products. I study the implications of a firm offering trade-ins to consumers who own used products sold by a competing firm.</td>
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<td>093-0310</td>
<td>Effect of Complex Multimedia Advertising Campaigns: A Causal Inference Model for Big Data</td>
<td>Pengyuan Wang, Assistant Professor, University of Georgia, United States</td>
<td>This study introduces a novel tree-structured causal inference model, which is nonparametric, flexible, computationally efficient, and suitable to analyze complicated nonlinear effects. The model enables automatic segmentation of consumers, allowing advertisers to better optimize the allocation of ad resources via accurate targeting.</td>
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Managing Digital Advertising Campaigns
Naren Agrawal, Professor, Santa Clara University, United States
Sami Najafi Asadollahi, Assistant Professor, Santa Clara University, United States
Stephen Smith, Professor, Santa Clara University, United States

Advertising agencies manage numerous ad campaigns for multiple clients in real-time. Because of uncertainties in the demand from campaigns for viewers, and the rate at which the target viewers visit websites, ensuring that campaigns proceed according to plan is a difficult challenge. We describe a methodology to manage such campaigns.

Markov Chain Models for Controlling the Exposure Frequency Distribution of Online Advertising
Ali Hojat, Assistant Professor, University of New Hampshire, United States
John Turner, Associate Professor, University of California, Irvine, United States

Recent trends in online advertising show that explicit reach and frequency specifications are preferred over aggregate impression or budget goals. We propose ad serving policies that can achieve a desired frequency distribution for an online ad campaign, over a fixed or rolling horizon, using Markov Chain models.

Waterfall Revenue Optimization for Online Advertising
Dmitri Arkhipov, Researcher, University of California, Irvine, United States
John Turner, Associate Professor, University of California, Irvine, United States
Michael Dillencourt, Professor, University of California, Irvine, United States
Amelia Regan, Professor, University of California, Irvine, United States

Advertisers pay a fixed price for impressions they accept and the ad network sequentially polls advertisers from a list until either an advertiser accepts the slot or time runs out. We formulate a stochastic optimization problem where advertisers vary in their time-to-decision and the prices they pay.

One Step-Ahead Predictive Ability in Nested Regression Models
Stergios Fotopoulos, Professor, Washington State University Pullman, United States
Silu Lyu, Student, Washington State University Pullman, United States

Out-of-sample tests of predictive accuracy play a significant role in economics and finance. Predicted errors are computed for nested regression models and test statistics are determined to test the predicted ability of models. Asymptotic results are evaluated for the statistics which play a significant role in decision making.

Cross-Temporally Coherent Forecasts for Decision Making
Nikolaos Kourentzes, Professor, Lancaster University Management School, United Kingdom
George Athanasopoulos, Professor, Monash University, Australia

Organizations rely on multiple forecasts to support decision making for different functions and planning horizons. Given different starting information and models, forecasts will differ, leading to misaligned decisions. We propose how to construct aligned forecast across all decision-making dimensions, supporting a single view of the future, with a “one-number” forecast.

Zero-Inflated Fuzzy Time Series in Supply Chain
Henrique Ebwank, Post Doc/Researcher, Sao Paulo State University - UNESP, Brazil
Peter Wanke, Associate Professor, Coppead Graduate School of Business, Brazil

Accurate forecasting has a high impact on inventory management, allowing low levels of inventory, savings on holding costs and lost sale costs. This work studies a real-world time series of medicine demand. Authors used a zero-inflated fuzzy time series approach and compared their results with other methods from literature.

The Bayesian Optimization Algorithm: Why OR Should Adopt It!
Myles Garvey, Assistant Professor, William Paterson University, United States
Jim Samuel, Assistant Professor, William Paterson University, United States
Rajiv Kashyap, Professor, William Paterson University, United States

Many discrete optimization problems are based on traditional metaheuristics. However, in the age of data science and machine learning, we should optimize with algorithms that “learn”. One such algorithm is the “Bayesian Optimization Algorithm”. Methods for employing this algorithm in OR/MS applications will be discussed.

Learning to Optimize Under Non-Stationarity
Wang Chi Cheung, Assistant Professor, Department of ISEM, Singapore
David Simchi-Levi, Professor, Massachusetts Institute of Technology, United States
Ruihao Zhu, Student, MIT, United States

We introduce algorithms that achieve state-of-the-art dynamic regret bounds for non-stationary linear stochastic bandits setting. It captures natural applications such as ads allocation in a changing environment. We show how the difficulty posed by the non-stationarity can be overcome by a novel marriage between stochastic and adversarial bandits learning algorithms.

Business Applications of Social Media
Wang Chi Cheung, Assistant Professor, Department of ISEM, Singapore
David Simchi-Levi, Professor, Massachusetts Institute of Technology, United States
Ruihao Zhu, Student, MIT, United States

We introduce algorithms that achieve state-of-the-art dynamic regret bounds for non-stationary linear stochastic bandits setting. It captures natural applications such as ads allocation in a changing environment. We show how the difficulty posed by the non-stationarity can be overcome by a novel marriage between stochastic and adversarial bandits learning algorithms.
We study the impact of home sharing on local real estate markets by leveraging a quasi-experiment on Airbnb. We find that home sharing has a greater impact on rental markets than housing markets. In addition, a 1% increase in Airbnb properties leads to larger increases in rents than home values.

A social media platform is an excellent resource for news due to the low cost of storage. Individuals authenticate this news based on trust and credibility of message and source. In this empirical study, we have tested the authentication strategies. The research benefits individuals and organizations in strategic planning.

We present a generalized production planning problem in which the total production capacity in each time period is the summation of binary multiples of n capacity modules of different sizes. We also consider a production planning problem with piecewise concave production costs. We develop exact algorithms to solve the aforementioned problems.

This study aims to understand the impact of environmental policy change on business operations with the help of social media analytics. Social media data, collected before and after the policy change, are analyzed to understand the operational decision making of the manufacturing organizations.

We use a genetic algorithm to find profit-maximizing part sequences and physical orientations for an additive manufacturing system that fulfills due-date-specific orders for custom parts with varying shapes, sizes, structures, and surface quality requirements. Numerical experiments demonstrate the impact of allocation and placement strategies on the system profit.

Long payment terms from trade credit are believed to be harmful to suppliers and is the driving force behind legislation across the globe, limiting its duration. Exploiting a natural experiment due to French regulation, we test theories on the relationship between trade credit and inventory decisions among European retailers.

We use a dataset from China-based FATP facilities producing millions of consumer electronic goods weekly, yet exhibiting worker turnover exceeding 300% annually. Worker turnover impacts productivity by disrupting critical workflows and relationships. Estimating endogenous turnover as an equilibrium using reinforcement learning, we prescribe compensation reducing variable costs by 5% ($135M).
**Friday, 04:30 PM - 06:00 PM**

_Florian Kaiser, Student, Universitaet Passau, Germany_

We investigate empirically the causal logic underlying the relationship between inventory efficiency and firm performance. The data set consists of 332 German manufacturing firms with 3,028 firm year observations and is based on annual financial data from 1990 to 2016. We use a panel vector autoregressive (PVAR) model.

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**093-0134  Operational Disruptions, Firm Risk, and Control Systems**

*William Schmidt, Assistant Professor, Cornell University, United States*

*Ananth Raman, Professor, Harvard University, United States*

Using a natural experiment, we show that firms with credible control systems experience a materially smaller increase in their risk and a smaller decrease in their market value in the aftermath of an operational disruption. We provide evidence that lower information asymmetry between the firm and investors drive these benefits.

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**093-2319  Path Dependency and Structuring Partnerships in New Product Development**

*John Ettlie, Professor, Saunders College of Business, United States*

Synchronizing partnerships entered a significant regression equation to predict new product success rate (Beta=.293, p=.001); 2) in a second, stepwise regression to predict the profitability percentage of new products; coordinated partnerships were the only significant dimension to enter the equation (Beta=.256, p=.004) controlling for scale and other variables.

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**093-2299  Perceptual Influences of Explicit and Tacit Knowledge Transfer on Product Innovativeness - An Experimental Study**

*Marc Roessler, Student, Rwh Aachen University, Germany*

*Peter Letmathe, Professor, Rwh Aachen University, Germany*

*Fehmi Yueksel, Student, Rwh Aachen University, Germany*

Innovativeness depends on the human factor in organizations. This experimental study investigates the effect of tacit versus explicit knowledge transfer on innovativeness. We show that knowledge transfer is subject to social influences. By using creative priming, we find that tacit knowledge transfer is only superior in an adequate social environment.

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**093-0533  Elective Portfolio and Patient Discharge Policies in Hospital Environments**

*Hessam Bavafa, Assistant Professor, University of Wisconsin-Madison, United States*

*Lerzan Ormecli, Associate Professor, Koc University, Turkey*

*Sergei Savin, Professor, University of Pennsylvania, United States*

*Vanitha Virudachalam, Student, University of Pennsylvania, United States*

We consider a hospital that maximizes profitability through two levers: the size and composition of its portfolio of elective procedures, and early discharges, which can relieve pressure on hospital resources. We find the optimal patient portfolio and discharge thresholds which we compare to the policies in two realistic settings.

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**093-0656  On Scheduling Appointments in Tandem Service Systems**

*Shan Wang, Student, Shanghai Jiao Tong University, China*

*Nan Liu, Assistant Professor, Boston College, United States*

*Guohua Wan, Professor, Shanghai Jiao Tong University, China*

In many healthcare settings, patients come for a series of services instead of a single one. A canonical example is infusion service: patients get their blood drawn first, then go to see the doctor, and finally receive treatment. We study how to manage appointment scheduling in such tandem service systems.
### 093-1817 New Tools for Predicting a Hospital Readmission

Stacey Mumbower, Assistant Professor, University of South Carolina, United States  
Ronda Hughes, Associate Professor, University of South Carolina, United States  
John Brooks, Professor, University of South Carolina, United States  
Neset Hikmet, Professor, University of South Carolina, United States  
Benjamin Schooley, Assistant Professor, University of South Carolina, United States  

Utilizing a hospital’s electronic health record platform, we added three risk assessment tools for nurses to use to standardize and improve the discharge planning process. Hospital readmissions were then predicted with the additional information using both a standard approach and a machine learning approach to compare predictive ability.

### 093-1811 Capacity Management in Inpatient Wards with Off-Service Placement and a Network View

Jing Dong, Assistant Professor, Columbia University, United States  
Feng (Susan) Lu, Assistant Professor, Purdue University, United States  
Huaxia Rui, Associate Professor, University of Rochester, United States  

Using patient level data from a large teaching hospital in Singapore, we empirically study the impact of patient off-service placement on individual-level patient outcomes. We use simulation to quantify the impact of system-level congestion.

### 093-1061 The Impact of Custom Contracting and the Infomediary Role of Healthcare GPOs

Rajib Saha, Assistant Professor, Indian School of Business, India  
Abraham Seidmann, Professor, University of Rochester, United States  
Vera Tilson, Associate Professor, University of Rochester, United States  

Most US hospitals purchase supplies through group purchasing organizations (GPOs), believed to lower costs due to demand aggregation. We reveal how the practice of custom contracting allows GPO vendors to exploit information asymmetry and earn even higher profits at the expense of the GPO member hospitals.

### 093-1855 Calling for Care? The Risky Proposition of Teletriage in Healthcare Demand Management

Ozden Cakici, Assistant Professor, American University, United States  
Alex Mills, Associate Professor, Baruch College, United States  

We study the impact of introducing teletriage to a healthcare system with traditional, or open-access primary care, and an Emergency Department (ED). Using a POMDP model, we find that while teletriage would benefit patients, it could be costly for the payer and increase ED usage. Our study provides these conditions.

### 093-0953 Coordinated Scheduling for In-Clinic and Virtual Medicine Patients in a Multi-Station Network

Douglas Morrice, Professor, The University of Texas at Austin, United States  
Jingyao Huang, Student, The University of Texas at Austin, United States  

Coordinated services and virtual medicine are the two innovative concepts being employed in the transformation from provider-centered care to patient-centered care. In this paper, we consider a patient appointment scheduling problem that combines those two concepts. More specifically, we study coordinated scheduling for both in-clinic and virtual medicine patients.

### 093-1849 Accommodating Arrival Variability in Emergency Departments

Martin Land, Associate Professor, University of Groningen, Netherlands  
Oskar Roemeling, Assistant Professor, University of Groningen, Netherlands  
Kees Ahaus, Professor, University of Groningen, Netherlands  
Ilse Grasmeijer, Student, University of Groningen, Netherlands  

Earlier research in Emergency Departments showed a rather weak relationship between patient arrival intensity and length of stay. In a mixed-method study combining analysis of quantitative time series, work sampling, and direct observation data with qualitative interview data, we reveal the mechanisms applied by physicians to accommodate the arrival variability.

### 093-1950 Physician-Staffing in Emergency Rooms: Opening the Black-box of ER Care via a Multi-Class Multi-Stage Network

Caglar Caglayan, Student, Georgia Institute of Technology, United States  
Yunan Liu, Associate Professor, North Carolina State University, United States  

We integrate patient-level and physician-level data to embed physician and patient features into a multi-class multi-stage network for estimating physician staffing required in emergency rooms.
### 093-1905
**Rethinking Patient Triage for Faster, More Cost-Effective Care in the Emergency Department**

Elham Torabi, Assistant Professor, James Madison University, United States  
Craig Froehle, Professor, University of Cincinnati, United States  
Christopher Miller, Assistant Professor, Case Western Reserve University, United States

Sub-optimal capacity management in the ED is partly due to the inadequacy of the ESI triage system. Using partitioning methods, we identified sub-groups of ESI-3 patients to be redirected to the fast track without compromising quality-of-care. We evaluated the effect of this policy on system performance using discrete-event simulation.

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### 093-1919
**Triage Variability in Emergency Rooms**

Roy Zuniga, Professor, INCAE, Costa Rica  
Luis Lopez, Professor, INCAE, Costa Rica

Triage in emergency rooms is a common tool used to assign scarce resources to pursue life preservation and the efficient allocation of resources. When patients arrive at the emergency department, triage consistency and conformity is expected, but is it really the case? Findings tell a different story from the expected.

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### 137
#### Contributed Session: Supply Chain Coordination and Integration  
**Chair(s): Stephen Disney**

#### 093-0456
**Mutual Trust Supply Chain Information Platform and Innovative Financial Scheme Based on Blockchain Technology**

Huqin Yang, Student, Peking University, China  
Shimiao Chen, Student, Wuhan University, China

We establish a blockchain information platform, linking supply chain alliance, financial institutions, and regulatory authority. After comparing the traditional credit financing and the innovative blockchain prepayment token financing, we find supplementing supply chain capital with blockchain token can reduce the financing cost and alleviate the financing difficulties of SMEs.

#### 093-0557
**Contract Design in a Supply Chain with Product Recall**

Bin Dai, Professor, Wuhan University, China  
Shimiao Chen, Student, Wuhan University, China

Traditional manufacturers often bear the recall costs that leads to a decrease in the quantity of order. We discuss three contracts by sharing the revenue and recall costs between a supplier and a manufacturer to induce recall efforts and order. We also find the coordination conditions for contracts.

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### 093-1285
**A Moderation Effect of Buyer-Supplier Trust on Relationships Between Supply Chain Integration and Procurement Performance**

Hong Wang, Student, Warwick Manufacturing Group, China  
Di Li, Lecturer, Birmingham City University, United Kingdom  
Daqiang Chen, Associate Professor, Zhejiang Gongshang University, China

Supply Chain Integration (SCI) has been widely applied within the automotive industry. However, the extant literature overlooks its impact on procurement performance, which is one of the key SC functions, especially post-Brexit. This research reveals a significant correlation between SCI and procurement performance, moderated by the trust between suppliers and buyers.

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### 093-2325
**Supply Chain Coordination by Trading Pricing Power for Information**

Xiaoyu Shen, Assistant Professor, Chongqing University of Posts and Telecommunications, China  
Hongyan Xu, Professor, Chongqing University, China  
He Huang, Professor, Chongqing University, China

Considering that a dominant buyer with pricing power orders from a supplier possessing private capacity information, we examine the scenarios under which supply chain coordination can be easily achieved by exchanging the pricing power for information, justifying the prevalence of wholesale price contract and the value of information asymmetry.

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### 093-2303
**When the Bullwhip Effect is an Increasing Function of the Lead Time**

Gerard Gaalman, Retired, University of Groningen, Netherlands  
Stephen Disney, Professor, Cardiff University, United Kingdom  
Xun Wang, Lecturer, Cardiff University, United Kingdom

We show a positive impulse response of the demand process leads to a bullwhip effect that always increases in the lead time when the order-up-to policy is used. Using the pole-zero analysis, we reveal when the ARMA demand impulse is positive.
The viability and success of ride-hailing platforms such as Uber or Lyft depend on how they manage their demand and pool of available drivers. In this paper, we examine how ride-hailing platforms can meet demand with supply in a competitive setting.

093-1466 Supplier Encroachment in a Non-Exclusive Reselling Channel
Parshuram Hotkar, Student, McCombs School of Business, United States
Stephen Gilbert, Professor, McCombs School of Business, United States
We explore the impact of encroachment when the reseller carries the product of more than one manufacturer. We allow for different levels of substitution depending upon the product and the channel and show that the lack of exclusivity of the reseller changes many of the traditional understandings of supplier encroachment.

093-2155 Smart Contract for Supply Chains of Distributors and Manufacturer
Hung Do, Assistant Professor, University of Vermont, United States
In this project, I study partial coordination of decentralized supply chains consisting of two distributors and a manufacturer over multi-period horizon. Smart contracts that include information sharing and terms on it are designed and their impact on the performance of each entity at the equilibrium is analyzed.

093-2178 Strategic Inventory in Non-Exclusive Reselling Environments
Abhishek Roy, Assistant Professor, Temple University, United States
Stephen Gilbert, Professor, McCombs School of Business, United States
Guoming Lai, Associate Professor, University of Texas Austin, United States
Although the effects of strategic inventory resulting from dynamic contracts in bilateral monopolies are well known, those effects are altered when competing manufacturers sell partially substitutable products through a common retailer. In contrast to a bilateral monopoly, contracts including both price and quantity commitments may arise in equilibrium.

093-1787 The Impact of Service Level on Inventory Decisions
Jaime Andrés Castañeda, Assistant Professor, Universidad del Rosario, Colombia
Sebastian Villa, Assistant Professor, Universidad De Los Andes, Colombia
This study analyzes how a service level concern influences inventory decisions. We explicitly model a service level target in the Newsvendor problem, providing an analytical solution. Building on the analytical solution, we develop a behavioral study to analyze the effect of different penalization costs on subjects’ ordering decisions.

093-2095 How Supply Chain Risks Influence Supplier Selection and Ordering Decisions: A Behavioral Investigation
Vincent (Junhao) Yu, Student, University of Minnesota, United States
Karen Donohue, Professor, University of Minnesota, United States
This study combines modeling and experimental methods to investigate buyer ordering behavior when facing suppliers with different types and levels of risks. Risks considered include reliability-related risks that disrupt the flow of supply and responsibility-related risks that influence the flow of customer demand.

093-2210 Cobotics: Collaborative Order Picking with Pick-Support AGVs
Alexandros Pasparakis, Student, Rotterdam School of Management, Netherlands
Jelle De Vries, Assistant Professor, Rotterdam School of Management, Netherlands
René De Koster, Professor, Rotterdam School of Management, Netherlands
Automated guided vehicles (AGVs) are increasingly used for transport in warehouse and production processes. Human workers can use these systems in various configurations. For example, a worker can follow the AGV, or an AGV can follow the worker. We study the implications of these setups using a real-effort experiment.

093-1602 Fairness Ideals in Resource Allocation: The Case of Inventory Pooling
Spiliotopoulou Eirini, Assistant Professor, Tilburg University, Netherlands
We study fairness ideals regarding inventory allocation when multiple stores are serviced from the same inventory pool. Experimental data shows that fairness consideration plays a significant role in the allocations proposed, while participants base their proposals on realized demands (thinking along fill rates) rather than absolute profits.

093-0386 Overcoming Integration Costs in Team Innovation: The Role of Gender Composition
Tian Chan, Assistant Professor, Emory University, United States
Haibo Liu, Assistant Professor, University of California Riverside, United States
Steffen Keck, Assistant Professor, University of Vienna, Austria
Friday, 04:30 PM - 06:00 PM

Wenjie Tang, Assistant Professor, National University of Singapore, Singapore

Innovation teams incur integration costs when attempting to converge. Such costs magnify when team-members are highly diverse or when the invention is non-decomposable. Using patent and experiment data, we show that teams with one or more women-members generate more valuable patents over all-men teams under high integration costs.

093-0394 Social Orientation and Firm Innovation from a Project Management Perspective
Xiaojin Liu, Assistant Professor, Virginia Commonwealth University, United States
Raul Chao, Associate Professor, University of Virginia, United States

This study addresses the questions of whether and how firm social orientation influences firm innovation. We propose mechanisms geared toward either proactive or reactive social orientation in project funding. Integrating large scale archival datasets, we empirically investigate the long term impact of social orientation on firm innovation.

093-1874 Reducing Wasteful Government Spending: An Empirical Study on Rebaselining in U.S. Federal Government Technology Programs
Anant Mishra, Associate Professor, University of Minnesota, United States
Dwaipayan Roy, Student, University of Minnesota, United States
Kingshuk Sinha, Professor, University of Minnesota, United States

We conceptualize and empirically examine the drivers of changes in the "baseline" - an aggregate plan which represents the original budget, schedule, and scope - of US Federal Government Information Technology programs. The findings of our study have important policy implications for minimizing the wastage of US taxpayer contributions.

093-1736 Workplace Environment Transparency, Employee Satisfaction, and Firm Innovation Performance
Hyunwoo Park, Assistant Professor, Ohio State University, United States
Morvarid Rahmani, Assistant Professor, Georgia Institute of Technology, United States

We study the relationship between employee satisfaction measured in multiple dimensions and firm innovation performance measured by patenting activities. Our preliminary analysis indicates that transparency and multi-faceted employee satisfaction have mixed and nuanced relationships with innovation performance.

141 Friday, 04:30 PM - 06:00 PM, Columbia 11
Track: Inventory Management
Invited Session: Stochastic Inventory Management
Chair(s): Joachim Arts

093-2038 Asymptotic Optimality of (r,nQ) Replenishment Policies for Serial Inventory Systems with Lost Sales
Marco Bijvank, Assistant Professor, University of Calgary, Canada
Tim Huh, Professor, Sauder School of Business, UBC, Canada
Ganesh Janakiraman, Professor, University of Texas Dallas, United States

We study multi-stage serial inventory systems with periodic reviews, deterministic lead times, and stochastic demand where excess demand is lost, and show that order-up-to policies are asymptotically optimal as the penalty cost grows large (i.e., high service levels). Furthermore, we illustrate the cost-effectiveness of these policies for moderate service levels.

093-0791 Asymptotic Optimality of Constant-Order Policies in Joint Pricing and Inventory Control Models
Xin Chen, Professor, Industrial & Systems Engineering, United States
Alexander Stolyar, Professor, University of Illinois Urbana-Champaign, United States
Linwei Xin, Assistant Professor, University of Chicago, United States

We study a joint pricing and inventory control problem with replenishment lead times. Although this fundamental problem has been extensively studied in the literature, the structure of the optimal policy remains poorly understood. We prove a simple constant-order and dynamic pricing policy is asymptotically optimal as the lead time grows.

093-1000 Controlling Distribution Inventory Systems with Shipment Consolidation and Compound Poisson Demand
Lina Johansson, Student, Lund University, Sweden
Danja R. Sonntag, Assistant Professor, University of Mannheim, Germany
Johan Marklund, Professor, Lund University, Sweden
Gudrun P. Kiesmueller, Professor, Universitaet Magdeburg, Germany

We consider a one-warehouse-multiple-retailer inventory system with compound Poisson demand and time-based shipment consolidation. Our aim is to develop computationally attractive heuristics to determine the shipment intervals and the required amount of safety stock that minimize total cost. A numerical study illustrates that the proposed heuristics perform very well.

093-0716 Deep Reinforcement Learning to Solve Dual Sourcing Inventory Problems
Joren Gijsbrechts, Student, KU Leuven, Belgium
Robert Boute, Associate Professor, KU Leuven, Belgium
Jan Van Mieghem, Professor, Northwestern University, United States
Dennis Zhang, Assistant Professor, Washington University St Louis, United States

We provide proof of concept that deep reinforcement learning (DRL) can be applied to the classic, intractable, dual sourcing inventory problem. Step-by-step guidance on how to apply DRL to a real data set is proffered together with a careful discussion of its performance, strengths, and weaknesses.
Friday, 04:30 PM - 06:00 PM

093-1075 Assortment Optimization for a Multi-Stage Choice Model
   Yunzong Xu, Student, Massachusetts Institute of Technology, United States
   Zhihuo Wang, Assistant Professor, University of Minnesota, United States
Motivated by practical selling scenarios that require previous purchases to unlock future options, we consider a multi-stage assortment optimization problem where the seller makes sequential assortment decisions with commitment and the customer makes sequential choices to maximize utility.

093-1889 Sample Boxes for Retail Products: Bundling Experience Goods to Leverage Consumer Uncertainty
   Alienze Yazdani, Student, University of Oregon, United States
   Eren Cil, Associate Professor, University of Oregon, United States
   Michael Pangburn, Associate Professor, University of Oregon, United States
Consumers often try a few varieties of an experience product before they establish their shopping routine. Sample boxes create value through helping consumers resolve their valuation uncertainties of these varieties earlier and at a lower cost. We study how firms and consumers share this added value under different market scenarios.

093-1956 Robust Demand Estimation with Customer Choice-Based Models for Sales Transaction Data
   Jongho Im, Assistant Professor, Yonsei University, South Korea
   Sanghoon Cho, Student, University of South Carolina, United States
   Mark Ferguson, Professor, University of South Carolina, United States
   Pelin Peğkun, Associate Professor, University of South Carolina, United States
We propose a statistical procedure that can estimate the effect of product attributes and unobservable lost sales under a choice-based demand model using only historical sales transactions, product availability data, and market share information. A set of simulation studies is conducted in comparison to several existing methods.

093-2249 Tell Me What I Want: A Study of Assortment Planning for Learning Consumers
   Dorothee Honhon, Associate Professor, University of Texas Dallas, United States
   Canan Ulu, Associate Professor, Georgetown University, United States
   Yulia Vorotyntseva, Post Doc/Researcher, Temple University, United States
We develop a model that incorporates consumer learning into a firm's assortment problem. Consumer's prior beliefs affects their choice of a product from a given category, and the subsequent experience, in turn, affects their beliefs and future choices. We analyze the firm's optimal assortment policy in this setting.

143 Friday, 04:30 PM - 06:00 PM, Monroe  Track: Humanitarian Operations and Crisis Management
Invited Session: Non-traditional Humanitarian Crises
Chair(s): Kezban Yagci Sokat

093-0513 Can Policies with Limited Enforcement Reduce Harm? Evidence from Transshipment Bans
   Hamsa Bastani, Assistant Professor, University of Pennsylvania, United States
   Joann de Zegher, Assistant Professor, MIT, United States
Transshipment bans are espoused as a partial solution to illegal fishing and forced labor in seafood supply chains. Despite significant enforcement challenges, we find that transshipment bans reduce transshipments by 57%, while only increasing landing fish costs by 3.2%. Surprisingly, bans do not appear to cause significant strategic evasion.

093-1990 Network Interdiction Models to Disrupt Human Trafficking Supply Chains
   Felipe Aros-Vera, Assistant Professor, Ohio University, United States
   Xiaodan XIE, Student, Ohio University, United States
This presentation provides a characterization of human trafficking networks (HTN) using a supply chain framework and a Network Interdiction Model (NIM) under incomplete information to cripple them. Results provide relevant insights aimed to inform law enforcement agencies in designing anti-trafficking policies and strategies.

093-2157 How Supply Chains Break
   Shawn Bhimani, Student, University of Leicester, United States
We present an econometric analysis of the types and causes of supply chain failure, including a framework to better predict, prevent and understand catastrophic supply chain disruptions. This is critical for continuity of operations in corporate, military, and humanitarian supply chains, as well as for breaking illegal supply chains.

093-0176 Modeling Human Trafficking
   Kezban Yagci Sokat, Lecturer, Northwestern University, United States
   Nezih Altay, Associate Professor, Depaul University, United States
Human trafficking has become a serious concern for society and the global economy. While there has been a lot of attention in this topic in the social contexts, there is little in the humanitarian operations community. We investigate the impact of different laws.

093-1526 Understanding Labor Trafficking
   Kezban Yagci Sokat, Lecturer, Northwestern University, United States
   Nezih Altay, Associate Professor, Depaul University, United States
Modern day slavery has become an alarming issue in supply chains. We investigate company policies on labor trafficking and their impact on company performance.
Contributed Session: Hunger Relief and Supply Chain Performance
Chair(s): Kate Hughes

093-0237 Product Availability, Consumer Stockpiling, and Hurricane Disasters: Empirical Evidence from a Natural Experiment
Xiaodan Pan, Assistant Professor, Concordia University, Canada
Martin Dresner, Professor, University of Maryland, United States
Benny Martin, Professor, University of Luxembourg, Luxembourg
Jun Zhang, Scientist, NOAA's Atlantic Oceanographic & Meteorological Laboratory, United States

As exogenous events, hurricanes provide a natural experiment to test retail operations performance during natural disasters. We study consumer stockpiling behavior prior to the onset of hurricane landfalls, with a focus on the impact of this behavior on in-store product availability for various formats of retail store outlets.

093-0965 Solving Food Insecurity: Can Supply Chain Management Bring About Time, Form, Place and Possession Utility?
Misty Blessley, Assistant Professor, Temple University, United States
Saif Mir, Assistant Professor, College of Charleston, United States

Food insecurity, or being without reliable access to enough nutritious food at an affordable cost, is a problem that continues to plague every corner of the globe. Our qualitative research reveals how needing all four economic utilities presents hunger relief challenges, and asks how supply chain management can help.

093-1883 Empirical Study of the Value of Agricultural Supply Chain Relationships in Mbale, Uganda
Megan Peters, Student, The George Washington University, United States
Erica Gralla, Assistant Professor, George Washington University, United States

We implement a field study in Uganda with USAID to empirically determine a set of common sources of relationship value (e.g., loans, credit) for farmers and agribusinesses. We develop a methodology for measuring these aspects of supply chain relationships, highlighting the differences between relationships in developed and developing economic contexts.

093-1984 An Exploratory Review of the Challenges in “Human Baby Milk” Logistics in the Indonesian Context
Bhanupriya Parasar, Student, Stamford International University, Thailand
Kate Hughes, Senior Lecturer, Stamford Int. University in Bangkok, Thailand
Rajavadevi Santhanakrishnan, Student, Stamford International University, Thailand
Chirag Naithani, Student, Stamford International University, Thailand

“Milk banks” in hospitals are a unique solution for providing sustenance for babies unable to feed from their mother. In Europe and the USA this is extended into a service. In Indonesia, this service is more complex with the requirement for a customer-to-customer solution for baby milk distribution.

Contributed Session: Supply Chain Management
Chair(s): Suman Niranjan

093-0848 A two-stage Network DEA Model for big-data-based supply chain analysis
Zheng Weijie, Student, Huazhong University of Science & Technology, China
Xianhao Xu, Professor, Huazhong University of Science & Technology, China
Yeming Gong, Professor, Business School, France

For the impact of big data investment on business performance of multinational enterprises, we construct an improved two-stage network DEA model. We build a framework to understand the role of big data investment and supply chain operations performance in business performance.

093-0323 How Firm’s Relational Capabilities Influence the Development of Dynamic Capabilities: The Case of Emerging Economies
Ritu Singh, Student, Indian Institute of Management Raipur, India
Parikshit Charan, Assistant Professor, Indian Institute of Management Raipur, India

Using the theory of relational view, this study investigates how firm’s relational capabilities affect the development of dynamic capabilities and performance in emerging economies using AMOS-SEM technique. The survey analysis of 219 firms indicates that when competition intensifies, the internal relational capability helps in building the dynamic capabilities more effectively.

093-0993 The Location Decision Revisited: The Drivers of Plant Openings and Closures in the Automotive Industry
Ioannis Siskos, Student, Vlerick Business School, Germany
Matthias Holweg, Professor, Oxford University, United Kingdom
Ann Vereecke, Professor, Vlerick Business School, Belgium
Luk Van Wassenhove, Professor, INSEAD, France

In this work we empirically investigate how macro-level factors influence the openings and closures of car assembly plants, using 200 opening and 82 closure cases between 2000 and 2015 in 30 countries. We extend the literature by further examining both events simultaneously.

093-2443 Effect of Consumer Personality and Culture on Loyalty: Role of Supply Chain Flexibility
Suman Niranjan, Associate Professor, Savannah State University, United States
Raymond Elliot, Student, Savannah State University, United States
David Simmonds, Assistant Professor, Savannah State University, United States
We conduct a two-country study (U.S. and India), where we analyze the effect that personality, culture, behavior of consumer, and service quality has on consumers trust, attitudes, and perceived customer service level, and thus lead to consumer loyalty. These relationships are analyzed with Supply Chain flexibility as a moderator.

**April 1, 04:30 PM - 06:00 PM**

**Invited Session: Economics models in operations**

**Chair(s): Wenxin Xu**

**093-1467 Target Ratcheting and Incentive Dynamics**

Iny Hwang, Associate Professor, Seoul National University, South Korea
Youngsoo Kim, Assistant Professor, University of Alabama Tuscaloosa, United States
Michael Lim, Associate Professor, Seoul National University, South Korea

Using agency model, we study how dynamic incentive is affected by the interplay between capability ambiguity and performance noise. We find that performance noise has contrasting consequences for ratchet effects depending on capability ambiguity. Our result has implications for the firm’s choice on managers under uncertainty between insider and outsider.

**093-2081 A Learning Algorithm for Capacity Provisioning of Queueing Systems with Impatient Customers**

Shining Wu, Assistant Professor, The Hong Kong Polytechnic University, Hong Kong

We study the capacity provisioning problem of a service system where system information is unknown. Customers are impatient and may abandon the system. We develop learning algorithm for the firm to maximize its long run profit by adjusting service capacity on the fly as more data are collected during operations.

**093-2103 The Drivers of Environmental Improvement, Or They Are Not**

Anton Shevchenko, Assistant Professor, Concordia University, Canada
Wenxin Xu, Assistant Professor, The Hong Kong Polytechnic University, Hong Kong
Karthik Murali, Assistant Professor, Oregon State University, United States

Our goal is to understand how the government should intervene to pressure incumbent industry members to make significant investments in a new, environmentally sustainable technology.

**Invited Session: Managing the Supply Chain Disruptions and the Ripple Effect: Models and Risk Analytics**

**Chair(s): Dmitry Ivanov**

**093-0241 Coordinating a Multi-Stage Supply Chain Under Disruption Risk**

Florian Lucker, Assistant Professor, Cass Business School, United Kingdom
Sunil Chopra, Professor, Kellogg School of Management, United States

We study multi-stage supply chains with centralized and decentralized structures. We show that managing a decentralized supply chain results in sub-optimal performance relative to a centralized supply chain. We discuss ways to mitigate the misalignment in the decentralized supply chain.

**093-0243 Competitive Sourcing of Substitute Products Under Supply Disruption**

Dmitry Ivanov, Professor, Berlin School of Economics and Law, Germany
Varun Gupta, Assistant Professor, Penn State University Erie, United States
Tsan-Ming Choi, Professor, Hong Kong Polytechnic Univ, Hong Kong

We study the effects of a capacity disruption on price-setting decisions for substitute products in a two-supplier, one-retailer supply chain setting. We examine the equilibrium pricing strategies of the suppliers and retailer and reveal the differences and commonalities in pricing based on timing.

**093-0645 Personal and Organizational Relationships in Humanitarian Supply Chains**

Iana Shaheen, Student, University of South Florida, United States
Maria Khilkovskaia, Student, University of South Florida, United States
Arash Azadegan, Associate Professor, Rutgers University, United States

This study examines the importance of personal and organizational relationships among humanitarian actors before and after disasters. By analyzing the responses from 20 organizations, we find that while most humanitarian organizations utilize their organizational relationships during inactive stages, personal relationships become more critical during active stages of disaster relief.

**093-1640 Disruption Tails or What is the Supply Chain Recovery? A Retail Supply Chain Simulation**

Dmitry Ivanov, Professor, Berlin School of Economics and Law, Germany

We study production-ordering behaviour in a retail supply chain (SC) in recovery and post-disruption periods with disruption risks. Disruption-driven changes in SC behaviour may result in backlog and delayed orders, the accumulation of which in the post-disruption period we call “disruption tails”.

**Contributed Session: Action Learning in POM Courses**

**Chair(s): Xiangjing Chen**

**093-2207 Cultivating an Action Learning Culture**

Stanley Fawcett, Professor, Weber State University, United States
Amydee Fawcett, Assistant Professor, Weber State University, United States
The Wall Street Journal headline read, "Many Colleges Fail to Improve Critical-Thinking Skills." The AACSB is placing more emphasis on "learning by doing" and high-impact practices. Action learning (aka, experiential education) enhances student engagement and improves learning outcomes. This workshop show how to cultivate a collaborative, action-learning culture.

093-2258 The Impact of Experiential Learning on Cross-Functional Team
Lillian Fok, Associate Professor, Western Washington University, United States
Audrey Taylor, Professor, Western Washington University, United States
Xiaoyu Shen, Assistant Professor, Chongqing University of Posts and Telecommunications, China
This study applies experiential learning principles to a cross-functional team comprised of undergraduate and graduate Accounting and Supply Chain Management students to solve capacity-related problems for a company. The research broadens students' understanding that business problems need multi-disciplinary involvement. The post-project survey captured the impact of EL on students.

093-2304 An Inquiry-Based Learning Exercise for Teaching Inventory Management
Matthew Drake, Associate Professor, Duquesne University, United States
Ryan Atkins, Assistant Professor, Duquesne University, United States
We describe an inquiry-based learning classroom exercise designed to enhance students' understanding of the analysis required to establish order quantities and reorder points. Students are given a scenario with several parameters missing from the description and have to request the required data from the instructor.

093-1365 Impact of Assessment Gamification on Student Attitude & Satisfaction in O&SCM Course
Hee Yoon Kwon, Student, University of Rhode Island, United States
Koray Ozpolat, Associate Professor, College of Business, United States
We deviate from the existing piecemeal approach of gamified course design and implement gamification in course elements meaningful to students and examine the effects on students' attitude and satisfaction.

093-2185 ASU Operations Management Review: A Way Forward for OM Research
Yimin Wang, Assistant Professor, Arizona State University Tempe, United States
Seongkyoon Jeong, Student, Arizona State University, United States
Seth Washispack, Student, Arizona State University, United States
Xiangjing Chen, Student, W.P. Carey School of Business, United States
Decreasing the distance between innovative knowledge in the OM literature and its beneficiaries is critical for our field to stay relevant. Using a structured and relevance-enhanced approach in a seminar setting, we developed a review delivering up-to-date knowledge to OM stakeholders, with promising benefits to PhD students, faculty, and practitioners.

150 Friday, 04:30 PM - 06:00 PM, Cabinet
Track: Sustainable Operations
Invited Session: Tutorial: Secondary Markets for Electronics; Design Challenges and Opportunities
Chair(s): Wedad Elmaghraby
093-2446 Secondary Markets for Electronics; Design Challenges and Opportunities: A Tutorial
Wedad Elmaghraby, Professor, University of Maryland, United States
This tutorial presents current research in market design for secondary markets in electronics. To resell returned and used electronic merchandise that flows back to retailers and OEMs, online Business-to-Consumer and Business-to-Business marketplaces have emerged. These markets present interesting operational challenges, encompassing inventory management, pricing and revenue management, and sustainability issues.