Ninth Annual Workshop on Supply Chain and Logistics

June 5, 2015

Bilkent University
Department of Industrial Engineering
Ankara, Turkey

Program Schedule

09:00- 09:20:	Registration and coffee/tea
09:20- 09:30:	Opening remarks
09:30- 10:20:	"Supplier Competition with Option Contracts for Discrete Blocks of Capacity" Lusheng Shao, University of Melbourne *Discussant*: Kemal Güler, Bilkent University
10:20-10:40:	Coffee break
10:40-11:30:	"Replenishment and Fulfillment Based Aggregation for General Assemble-to-Order Systems" Emre Nadar, Bilkent University *Discussant*: Hans Frenk, Sabancı University
11:30-11:45:	Coffee break
11:45-12:15:	Practice session I "Supply Chain Management in Healthcare" Doğan Tatari, Memorial Healthcare Group
12:15-13:30:	Lunch break
13:30-14:20:	"Intertemporal Pricing and Strategic Rationing When Selling to Snobbish Consumers" Kenan Arifoğlu, University College London *Discussant*: Özgen Karaer, Middle East Technical University
14:20-14:40:	Coffee break
14:40-15:30:	"Bid Price Optimization for Truckload Carriers in Simultaneous Transportation Procurement Auctions" Gültekin Kuyzu, TOBB University of Economics and Technology *Discussant*: Deniz Özdemir, Yaşar University
15:30-15:50:	Coffee break
15:50-16:20:	Practice session II "Operational Excellence Management and Logistics at Ekol A.Ş." Oğuzhan Yıldız, Ekol A.Ş.
16:30-19:00:	Closing cocktail (Rector's Residence - Building 49)

Supplier Competition with Option Contracts for Discrete Blocks of Capacity

Lusheng Shao, University of Melbourne
(Joint work with Edward Anderson from the University of Sydney and Bo Chen from the University of Warwick)

Abstract: When a buyer faces an uncertain demand, it is common to reserve capacity in advance by paying a reservation price, and then, after knowing the demand, decide how much capacity to use by paying an execution price. We consider a discrete version of this problem in which competing suppliers each choose a reservation price and an execution price for blocks of capacity, and the buyer needs to decide which blocks to reserve. We show how to solve the buyer's (combinatorial) problem efficiently and also show that suppliers can do no better than offer blocks at execution prices that match their costs (making profits only from the reservation portion of their bids). Finally we show that, at equilibrium, the buyer selects the welfare maximizing set of blocks.

Lusheng Shao is a Lecturer (Assistant Professor) of Operations Management in the Faculty of Business and Economics at the University of Melbourne. Prior to joining Melbourne in January 2015, Lusheng studied his PhD in Discipline of Business Analytics at the University of Sydney Business School. Lusheng also holds a Bachelor degree in Information Systems and a Master degree in Management Science, both from Northeastern University. His general research fields are supply chain management and the interfaces of operations management with other disciplines, e.g., marketing and economics. Lusheng is currently working on competitive bidding and contract design problems in electricity markets and supply chains. Part of his research has appeared at the journals of Production and Operations Management and Decision Sciences.

Discussant: Kemal Güler is a visiting scholar at the Department of Industrial Engineering at Bilkent. Prior to Bilkent, he worked as a principal research scientist at Hewlett-Packard Laboratories, Palo Alto, California, as an assistant professor of Economics at the University of Houston, and as visiting professor at Rice University and at Cleveland State University. His research interests are in applied mechanism design - game theory, econometrics, and behavioral economics - with applications in economics and OR/OM. He holds a B.A. degree from Boğaziçi, an M.Sc. degree from Baylor University, both in Economics, and a Ph.D. degree in Social Science from Caltech.

Replenishment and Fulfillment Based Aggregation for General Assemble-to-Order Systems

Emre Nadar, Bilkent University
(Joint work with Alp Akçay from Bilkent University, and Mustafa Akan and Alan Scheller-Wolf from Carnegie Mellon University)

Abstract: We consider an assemble-to-order system with multiple products, multiple components which may be demanded in different quantities by different products, batch ordering of components, random lead times, and lost sales. We model the system as an infinite-horizon Markov decision process under the discounted cost criterion. A control policy specifies when a batch of components should be produced (i.e., inventory replenishment) and whether an arriving demand for each product should be satisfied (i.e., inventory allocation). As optimal solutions for such problems are computationally intractable for even moderate sized systems, we approximate the optimal cost function by reducing the state space of the original problem via a novel aggregation technique that uses knowledge of products' component requirements and replenishment batch sizes.

We establish that a lattice-dependent base-stock and lattice-dependent rationing policy is the optimal inventory replenishment and allocation policy for the aggregate problem under a disaggregation rule that disaggregates each aggregate state into its two extreme original states. This rule drastically reduces the per iteration computational complexity of the value iteration algorithm for the aggregate problem (without sacrificing much accuracy, according to our numerical experiments). We further alleviate the value iteration computational burden by eliminating suboptimal actions based on our optimal policy structure.

For systems in which there is a product that has fulfillment priority over all other products at optimality, we are able to derive finite error bound for the cost function of the aggregate problem. With these bounds, we show that the value iteration algorithm in the original problem that starts with the aggregate solution converges to the optimal cost function. Numerical experiments indicate that such an algorithm has distinct computational advantage over the standard value iteration method in the original problem.

Emre Nadar is an assistant professor in the Department of Industrial Engineering at Bilkent University. He received his B.S. degree in Industrial Engineering from Bilkent University in 2007, and his M.S. and Ph.D. degrees in Operations Management from the Tepper School of Business at Carnegie Mellon University in 2009 and 2012, respectively. His research interests include dynamic programming and optimal stochastic control with applications to supply chain management and sustainable operations. He is the winner of the POMS College of Supply Chain Management 2012

Student Paper Competition, and the finalist in the INFORMS George E. Nicholson 2012 Student Paper Competition.

Discussant: Hans Frenk joined the Faculty of Engineering and Natural Sciences at Sabancı University five years ago. He graduated from Utrecht University (master degree in mathematics) and did his PhD thesis (1984) within the field of renewal theory and regenerative processes and its connection to Banach algebras at the Econometric Institute, Erasmus University, Rotterdam, The Netherlands. Through the years his main research interest is in optimization, convex and quasi-convex analysis and its connection to stochastic processes. At the moment his research is in applications of those techniques to problems in Management Science and Engineering (maintenance, inventory control and revenue management). He published around 70 papers both in theoretical and applied oriented journals.

Practice Session I: Supply Chain Management in Healthcare
Doğan Tatari, Memorial Healthcare Group

Abstract: Turkish private health sector offers a lot of opportunities, most of the companies in the market demonstrates great effort to increase their market share across the country. Under these competitive circumstances, the purchasing cost, operational quality and pace become very crucial. Thus, robust supply chain management system has remarkable role in order to decrease purchasing cost and increase material availability to meet the demand just in time and spread the cost risks. By referring to both unique hospital dynamics and global supply chain management benchmarks, Memorial Supply Chain Management is reengineered. Material resource planning algorithms are implemented to respond the demand volatility efficiently. Furthermore, multi-level logistic structure is hierarchized to have consistent stock levels and flexible distribution between warehouses. The positive impact of the applications are observed on financial and operational performance reports as well.

Doğan Tatari has been a Purchasing and Business Development Coordinator at Memorial Healthcare Investments since September, 2010. Mr. Tatari graduated with a bachelor's degree from the department of Industrial Engineering at Boğaziçi University. He also completed his MBA program at the same university. Mr. Tatari has over 17 years of experience in the field and in business consulting including Operations, Supply Chain

Management, Business Development, Strategy, Marketing and Product management, with particular focus in the telecommunication and technology. He served as a Lead Business Consultant at Nokia Siemens Networks, Nordics, Ukraine and Istanbul Regions. Previously, he worked at Accenture and Peppers and Rogers as Manager for Business Development in Telecommunication, Media and Entertainment Industries in Saudi Arabia and Turkey. Mr. Tatari has served as guest lecturer in Boğaziçi University, Industrial Engineering Department.

Intertemporal Pricing and Strategic Rationing When Selling to Snobbish Consumers

Kenan Arifoğlu, University College London
(Joint work with Sarang Deo from Indian School of Business and Seyed M. R. Iravani from Northwestern University)

Abstract: Firms selling to snobbish (exclusivity-seeking) consumers whose valuation decreases in the fraction of population that buys the product display several differences in their pricing and rationing strategies: some firms offer markdown pricing while others charge a uniform price, some create scarcity while others do not. This paper develops a stylized analytical model to understand the drivers behind these strategies. A monopolist sells a product over two periods to two segments of strategic (forward-looking) and snobbish consumers with high and low functional value of the product, respectively. We find that firm's pricing and rationing strategies depend critically on the proportion of high-value consumers and on consumers' sensitivity to consumption. The firm implements strategic rationing, i.e., it creates scarcity intentionally, only if consumers' sensitivity to consumption is sufficiently high. Further, it is optimal to charge a uniform price when the proportion of high-value consumers is sufficiently high, and to mark the price down when the proportion of high value consumers is low. When the proportion of high value consumers is intermediate, the pricing policy changes with consumers' sensitivity to consumption; higher values of sensitivity to consumption leading to markdown pricing while lower values of sensitivity to consumption leading to uniform pricing. We also show that there are two main drivers which increase the value of consumption in the first period and thereby lead to price markdowns in snob-appeal products, namely, rationing due to snobbish consumer behavior and the desire to purchase the product early in the first period when it is more exclusive. Therefore, with snobbish consumers, the firm may mark the price down even in the absence of rationing. Under certain conditions, contrary to

intuition, the product can be more exclusive under markdown pricing than under uniform pricing, and more exclusivity-seeking consumer behavior can actually induce the firm to reduce the extent of exclusivity. As expected, the negative impact of strategic consumer behavior is lower when selling to snobbish consumers, because decreasing capacity to counteract strategic consumer behavior also increases product exclusivity and thus consumers' willingness to pay. Yet, ignoring strategic consumer behavior can be more costly with snobbish consumers.

Kenan Arifoğlu is an Assistant Professor (Lecturer) in the Department of Management Science and Innovation. Dr. Arifoğlu received his PhD from the Industrial Engineering and Management Sciences (IEMS) department at Northwestern University (Evanston, IL, USA) in 2012. He also has MScs from the IEMS department at Northwestern University (2008) and the Industrial Engineering department at Koç University (Istanbul, Turkey, 2007). He got his BSc in industrial engineering from Koç University in 2005. Before joining UCL, he had a postdoctoral position in Ross Business School at University of Michigan (Ann Arbor, MI, USA). Dr. Arifoğlu's current research analyses the impact of consumer behavior on the performance of supply chains and service systems. His broad research interests lie in the areas of healthcare management, supply-chain management, production and inventory systems, and pricing and revenue management.

Discussant: Özgen Karaer is an Assistant Professor in the Department of Industrial Engineering at METU. She holds a B.S. degree in Industrial Engineering (METU, 2002), and a M.S. and Ph.D. degree in Management Science & Engineering (Stanford University, 2008). Prior to joining METU, Özgen worked as a senior consultant and consequently a manager in the Operating Strategy department at Gap Inc. for about four years. During her tenure at Gap Inc., she worked on various projects involving replenishment prioritization, promotion hindsighting, demand planning, store inventory allocation, merchandise-test store selection, store performance measurement, and RFID. Her research is in strategic interactions in supply chains and retail management. She is especially interested in RFID applications and investments, retail channel management, and inventory allocation mechanisms.

Bid Price Optimization for Truckload Carriers in Simultaneous Transportation Procurement Auctions

Gültekin Kuyzu, TOBB University of Economics and Technology
(Joint work with Çağla Gül Akyol from TOBB University of Economics and Technology, and Özlem Ergun and Martin Savelsbergh from Georgia Institute of Technology)

Abstract: We study simultaneous transportation procurement auctions from a truckload carrier's perspective. We formulate a stochastic bid price optimization model aimed at maximizing the carrier's expected profit. The model accounts for synergies among lanes and competing carriers' bid patterns. We develop an iterative coordinate search algorithm to find high quality solutions. The benefits of employing the bid price optimization technology are demonstrated through computational experiments involving a simulated marketplace.

Gültekin Kuyzu is an Assistant Professor in the Department of Industrial Engineering at TOBB University of Economics and Technology. He received his B.S. degree in Industrial Engineering from the University of Pittsburgh in 2002, and his Ph.D. degree in Industrial and Systems Engineering from Georgia Institute of Technology in 2007. Prior to joining TOBB ETÜ, he worked for four years at Agility, a leading global third party logistics company, where he developed optimization based decision support systems and other supply chain solutions for internal and external customers around the world. His research interests lie in computational optimization with applications in collaborative logistics, transportation procurement auctions, inventory routing, and production planning.

Discussant: Deniz Özdemir is a Professor of Industrial Engineering at Yaşar University. Before joining to Yaşar University, she worked as associate professor in Toros University (Mersin), Universidad Autonoma de Nuevo Leon (Monterrey, Mexico) and as a research associate in McGill University, Canada. She obtained her B.S and M.S. degrees in Industrial Engineering from Bilkent University (Turkey) in 1996 and 1998, respectively. She also obtained M.S. and Ph.D. degrees in Management specializing in Production and Operations Management area from INSEAD Fontainebleau, France in 2001 and 2004, respectively. Her current research interests are in the areas of supply chain management, reverse logistics, simulation methodology and applications.

Practice Session II: Operational Excellence Management and Logistics at Ekol A.Ş.

Oğuzhan Yıldız, Ekol A.Ş.

Abstract: In order to respond more quickly to customers' expectations about quality and standards; simplified, purified from all non-value added processes and a balanced operation structure should be established. Within Operational Excellence & Logistics, we have gathered leading competence and experience to help our large operation department to do more with less, from implementing a new problem solving strategy to improving all the processes at the warehouses. Lean approach helps organization to create customer-focused processes and a culture of continuous improvement in order to reach Operational Excellence. Our young Industrial Engineering department can provide support in defining implementation strategies, problem solving, performing overall diagnostics and implementation of lean way of Ekol Logistics. Huge amount of savings is only bonus.

Oğuzhan Yıldız graduated from Bilkent University, Department of Industrial Engineering in 2002. His career began in the same year at B/S/H Turkey Çerkezköy Production Center as a production planning head. He took an active role in the establishment of B/S/H Turkey, and held various management positions such as production planning, purchasing, material planning and warehouse management, finally supply chain director in Avery Dennison EMEA between 2007 and 2011. Oğuzhan worked as the logistics center manager and was responsible of the supply chain and the operational processes at DeFacto between 2011 and 2013. After one-year experience as a plants director in Vefa group, he joined Ekol A.Ş. and has been appointed as an Operational Excellence manager as of 2014. Oğuzhan is a specialist in the fields of establishing efficient management systems, organizational structuring, and operational excellence and logistics. He is married and has two daughters.

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