Winter 2015 Newsletter

INFORMS Behavioral Operations Management Section

If you have any information for the next issue of this semiannual newsletter please forward an announcement to kschultz@afit.edu. This newsletter cannot continue without your input.

Old copies of the newsletter can be found at the Section Website https://www.informs.org/Community/BOM

General topics include:
A. People
B. Places (Meetings)
C. Things (Research)
D. My Favorite Paper

A. People:

Julie and Rob Niederhoff have adopted a 16 year old daughter, Maryna from the Ukraine. They hosted Maryna during the summers of 2013 and 2014 and adopted her shortly before her 16th birthday when she would have become ineligible for further orphan support in the Ukraine. This brings the Niederhoff clan to four children and 2, exhausted, parents. Photo: Maryna (16), Katie (9), Jorge (7), August (4), Julie (>20) and Rob.

Özalp Özer, Yanchong Zheng and Kay-Yut Chen won the Management Science Best Paper Award for 2014 with Trust in Forecast Information Sharing. Congratulations to them for a great paper and for demonstrating the value of Behavioral work to the larger audience.

Karen Brown recently retired from Thunderbird School of Global Management, ending 30 years as a globe-trotting professor. She considers her new status as Professor Emerita of Operations and Project Leadership the starting point for a permanent sabbatical. Accordingly, she continues to write articles and teaching cases.

Karen also reports she married her long time partner, David Wolford, last March.

Congratulations to Bahriye Cesaret, fifth-year Ph.D. candidate in Operations Management at the Naveen Jindal School of Management, for receiving Outstanding Student Teacher Award for 2013-2014.

Say hello to Teddy, a recent addition to the family of Rohit Verma.

Rumor has it that Bernardo Quiroga, has accepted a position at Clemson University. Soon to be Dr. Quiroga worked at Penn State and has a paper with A. Ovchinnikov and B. Moritz, How to Compete Against a Behavioral Newsvendor, forthcoming in POM. Since your intrepid editor was also vying for the job at Clemson, we can expect great things from Mr. Quiroga in the future. Best of luck Bernardo.

B. Places

The 2015 POMS Conference will take place in Washington, D.C. this year from May 8th to the 11th. There will be a Track “Behavior in Operations Management” chaired by Anton Ovchinnikov of the Queen’s School of Business, and Michael Becker-Peth of the University of Cologne. This year, we will have 18 sessions in total, including the POMS Editors session on “Opportunities in Behavioral Operations: Different Perspectives”, the joint session “BIOM and Retail Operations”, “Behavioral Research in Pricing and Procurement” and many other interesting sessions. All are invited to attend the track and we look forward to interesting talks and stimulating conversations.

2015 INFORMS Annual Meeting will be held in Philadelphia from 1-4 November. The Cluster of Behavioral Operations in will consist of 14 sessions on Behavioral Operations Management or closely related topics. This is a great opportunity to bring together leading academics in BOM, industry experts, students, INFORMS members, and all others who are interested in Behavioral Operations. The conference will take place on Nov. 1-4, 2015 at the Pennsylvania Convention Center & Marriott Philadelphia Downtown. Tony Haitao Cui at University of Minnesota will be serving as the Chair for the Behavioral Operations Management Cluster.

The 2015 International Workshop on Behavioral Operations Management will be jointly organized by Tsinghua University and Tianjin University and take place in Tianjin University in December 2015. Tianjin University (TJU),
established in 1895 as Peiyang University, is the first university in China. Over 119 years, more than 200,000 students have studied at TJU.

The 2014 International Workshop on Behavioral Operations Management jointly organized by Tsinghua University and University of Shanghai for Science and Technology was held in Shanghai China on December 15-16, 2014. There were 170 conference participants. Yuxin Chen (NYU Shanghai University), Wedad Elmaghraby (Univ. of Maryland), Mirko Kremer (Frankfurt School of Finance & Management), and Kenneth Schultz (The Air Force Institute of Technology) gave keynote speeches. Tony Haitao Cui, Shu-Cherng Fang, Shaorong Sun, and Xiaobo Zhao served as co-chairs for the workshop.

The Samuel Curtis Johnson Graduate School of Management is proud to host the 2015 Annual Behavioral Operations Conference at Cornell University in Ithaca, New York, on June 24 – 26, 2015. The goal of this conference is to bring together researchers with a common interest in the operations interface between human behavior studies and analytical modeling, with the aim of sharing current work, identifying new research problems and developing relationships between scholars in the field. Conference keynote speakers will be Vishal Gaur and Robert J. Bloomfield. The conference will start with a one-day “Young Scholars Workshop” (Note that the Manufacturing and Services Operations Management (MSOM) Conference will be held in Toronto, on Sunday, June 28, 2015. Toronto is about a four and a half-hour drive from Ithaca.) Please see our website for further details: http://jindal.utdallas.edu/behavioral-operations-conference/

We look forward to seeing you in Ithaca!

C. Things:

We will use this forum to keep members updated on papers published in the area of Behavioral Operations Management. This is a great opportunity for you to get the word out on your research. Papers qualify if they are aimed principally for an Operations Management audience and if they explicitly include consideration of behavioral factors other than then strict profit maximizing, or if they empirically test that assumption. Normally we include papers on individual, not organizational behavior but for the purposes of this newsletter we will accept both. Papers do NOT have to be empirical.

Please send citations and abstracts of any paper accepted for publication to KSchultz@afit.edu

K. A. Brown, KA, Schmitt, TG, and Schonberger, RJ, Three Challenges for a Lean Enterprise in Turbulent Times. To appear in the May issue of Interfaces. This paper examines the behaviorally-inspired missteps that can lead a lean organization astray when economic and market uncertainties arise. The three phenomena identified in the paper are: 1. Locked operating model, 2. Backward Drift, and 3. Lean Islands.

This paper describes the plight of rural hospitals, describing technical and behavioral factors as they relate to the growing application of telemedicine, an example of a shift in the healthcare delivery supply chain’s structure.


Kocabiyikoglu A., Gogus C.I., Gonul M.S., “Revenue Management vs. Newsvendor Decisions: Does Behavioral Response Mirror Normative Equivalence? http://onlinelibrary.wiley.com/doi/10.1111/poms.12297/full We study and compare decision-making behavior under the newsvendor and the two-class revenue management models, in an experimental setting. We observe that, under both problems, decision makers deviate significantly from normative benchmarks. Furthermore, revenue management decisions are consistently higher compared to the newsvendor order quantities. In the face of increasing demand variability, revenue managers increase allocations; this behavior is consistent with normative patterns when the ratio of the selling prices of the two customer segments is less than 1/2, but is its exact opposite when this ratio is greater than 1/2. Newsvendors' behavior with respect to changing demand variability, on the other hand, is consistent with normative trends. We also observe that losses due to leftovers weigh more in newsvendor decisions compared to the revenue management model; we argue that overage cost is more salient in the newsvendor problem because it is perceived as a direct loss, and propose this as the driver of the differences in behavior observed under the two problems.

Hartwig, R., K. Inderfurth, A Sadrieh and G. Voigt. Strategic Inventory and Supply Chain Behavior. Production and Operations Management (2015), doi 10.1111/poms.12325 http://dx.doi.org/10.1111/poms.12325 Based on a serial supply chain model with two periods and price-sensitive demand, we present the first experimental test of the effect of strategic inventories on supply chain performance. In theory, if holding costs are sufficiently low, the buyer builds up a strategic inventory (even if no operational reasons for stock-holding exist) to limit the supplier's market power, and to increase the own profit share. As it turns out, this enhances the overall supply chain performance. The supplier anticipates the effect of the strategic inventory and differentiates prices to capture a part of the increased supply chain profits. Our results show that the positive effects of strategic inventories are even more pronounced than theoretically predicted, because strategic inventories empower buyers by shifting the perception of the fair split. Overall, strategic inventories have a double positive effect, a strategic and a behavioral, both reducing the average wholesale prices and dampening the double marginalization effect. The latter effect leads to more equitable payoffs.

Ozalp Ozer with Karen Zheng "Markdown or Every-day-low price? The Role of Behavioral Motives" is forthcoming in Management Science. We study a seller's optimal pricing and inventory strategies when behavioral (non-pecuniary) motives affect consumers' purchase decisions. In particular, the seller chooses between two pricing strategies, markdown or everyday-low-price, and determines the optimal prices and inventory level at the beginning of a two-period selling season. Two salient behavioral motives that impact consumers' purchase decisions and the seller's optimal strategies are anticipated regret and misperception of product availability. Regret arises when a consumer initially chooses to wait but encounters stockout later, or when the consumer buys the product at the high price but realizes that the product is still available at the markdown price. In addition, consumers often perceive the product's future availability to be different than its actual availability. We determine and quantify that both regret and availability misperception have significant operational and profit implications for the seller. For example, ignoring these behavioral factors can result in up to 10% profit losses. We contrast the roles of consumers' strategic (pecuniary) motives with their behavioral (non-pecuniary) motives in affecting purchase, pricing, and inventory decisions. The presence of the behavioral motives reinstates the profitability of markdown over everyday-low-price, in sharp contrast to prior studies of
only strategic motives which suggest the contrary. We characterize how and why strategic versus behavioral motives affect decisions in distinctive manners. In doing so, this paper also introduces and determines the behavioral benefits of pricing in leveraging consumers' behavioral regularities. We advocate that tactics which may intensify consumers' misperception of availability, such as intentionally disclosing low inventory levels, can have a far-reaching impact on improving the seller's profit.

Ozalp Ozer with A. Brinkhoff and G. Sargut "All You Need is Trust? An Examination of Interorganizational Supply Chain Dyads" is forthcoming in Production and Operations Management. This paper examines the antecedents of supply chain project success. We first propose and test a model that describes the role of relationship-level factors (trust and asymmetric dependence) and project-level factors (between-firm communication and within-firm commitment) in determining supply chain project success. We find that project-level factors completely mediate the effect of trust on project success. We conclude that trust, despite being a stronger predictor compared to asymmetric dependence, is necessary but not sufficient for supply chain project success. We then proceed to further explore the role of these factors by introducing a categorical scheme that differentiates supply chain projects based on the decision rights configuration of each project. This categorization enables us to explore how relationship-level and project-level factors can have different impact on performance based on the characteristics of a supply chain project. The findings offer insights into how to effectively manage supply chain projects and inter-firm alliances.

R. Batt and C. Terwiesch. Waiting Patiently: An Empirical Study of Queue Abandonment in an Emergency Department. We study queue abandonment from a hospital emergency department. We show that abandonment is influenced by the queue length and the observable queue flows during the waiting exposure, even after controlling for wait time. For example, observing an additional person in the queue or an additional arrival to the queue leads to an increase in abandonment probability equivalent to a 25-minute or 5-minute increase in wait time, respectively. We also show that patients are sensitive to being “jumped” in the line and that patients respond differently to people more sick and less sick moving through the system. This customer response to visual queue elements is not currently accounted for in most queuing models. Additionally, to the extent the visual queue information is misleading or does not lead to the desired behavior, managers have an opportunity to intervene by altering what information is available to waiting customers.

Xiaoyang Long and Javad Nasiry. Prospect Theory Explains Newsvendor Behavior: The Role of Reference Points Current understanding in operations management is that Prospect Theory, as a theory of decision making under uncertainty, cannot systematically explain the ordering behavior observed in experiments on the newsvendor problem. We suggest this is because the newsvendor's reference point is assumed to be the status quo, i.e., zero payo_. We propose an alternative based on newsvendor's salient payo_s and show that Prospect Theory can, in fact, account for experimental results.

The following papers were the finalists for the 2014 INFORSM Behavioral Operations Management Best Working Paper Award.

Capacity Investment in Supply Chains: Contracts and the Hold-up Problem by Andrew Davis and Stephen Leider. Suppliers are often reluctant to invest in capacity if they feel that they will be unable to recover their initial investment costs in subsequent negotiations with buyers. In theory, a number of different coordinating contracts can solve this form of hold-up problem and induce first best investment levels by the supplier. In this study, we experimentally evaluate the performance of these contracts in a two-stage supply chain. We develop a novel experimental design where retailers and suppliers bargain over contract terms, and both roles have the ability to make multiple back-and-forth offers while also providing feedback on the offers they receive. Our main result suggests that an option contract is best at increasing investment levels, and thus increasing overall supply chain profits. Furthermore, after investigating the evolution of offers during bargaining, we observe that participants tend to place particular emphasis on "superficial fairness." Specifically, participants focus more on
setting a wholesale price that is in the middle of the available contracting space, while largely ignoring the coordinating contract parameter. We show that this behavioral tendency drives the favorable performance of the option contract, as there is a large set of coordinating terms which, conditional on having a superficially fair wholesale price, generate the proper incentives for suppliers to invest, and thus increase the total expected supply chain profit.

**Designing Incentive Systems for Truthful Demand Information Sharing – Theory and Experiment** by Lisa M. Scheele, Marco Slikker and Ulrich W. Thonemann. We consider a firm where Sales is responsible for demand forecasting and Operations is responsible for ordering. Sales has better information about the demand than Operations and sends a non-binding demand forecast to Operations. To incentivize truthful demand information sharing we include a forecast error penalty in the incentive system of Sales. Besides monetary payoffs we add the behavioral factors of loss aversion and lying aversion to the utility function of Sales. We model the setting as a signaling game and derive the pareto-dominant separating equilibria of the game. In a laboratory experiment, we observe human behavior that is in line with the predictions of the behavioral model, but deviates substantially from expected-payoff-maximizing behavior. We use the behavioral model to design incentive systems for truthful information sharing and validate the approach in an experiment with out-of-sample treatments and out-of-sample subjects. The results provide guidance for managers who are interested in reducing forecast biases and increasing supply chain efficiency.

**Remanufacturing, Third-Party Competition, and Consumers’ Perceived Value of New Products** by Vishal Agrawal, Atalay Atasu and Koert van Ittersum. In this paper, we investigate whether and how the presence of remanufactured products and the identity of the remanufacturer influence the perceived value of new products through a series of behavioral experiments. Our results demonstrate that the presence of products remanufactured and sold by the Original Equipment Manufacturer (OEM) can reduce the perceived value of new products by up to 8%. However, the presence of third-party remanufactured products can increase the perceived value of new products by up to 7%. These results suggest that deterring third-party competition via preemptive remanufacturing may reduce profits, while the presence of third-party competition may actually be beneficial for an OEM.

M. Bruccoleri, S. Cannella, G. LaPorta. (2014) "Inventory record inaccuracy in supply chains: the role of workers’ behavior", International Journal of Physical Distribution & Logistics Management, Vol. 44 Iss: 10, pp.796 – 819. The purpose of this paper is to explore the effect of inventory record inaccuracy due to behavioral aspects of workers on the order and inventory variance amplification. The authors adopt a continuous-time analytical approach to describe the effect of inbound throughput on the inventory and order variance amplification due to the workload pressure and arousal of workers. The model is numerically solved through simulation and results are analyzed with statistical general linear model. Inventory management policies that usually dampen variance amplification are not effective when inaccuracy is generated due to workers’ behavioral aspects. Specifically, the psychological sensitivity and stability of workers to deal with a given range of operational conditions have a combined and multiplying effect over the amplification of order and inventory variance generated by her/his errors.

A. Kundu, V. Jain, S Kumar and C Chandra. A journey from normative to behavioral operations in supply chain management: A review using Latent Semantic Analysis. This study aims to systematically review the cross disciplinary literature covering the time period from 1934 to January 2013 on behavioral operations in supply chain in order to identify and define the taxonomy of the research on power influences in supply chain. A list of noted journals and search results from Science Direct and Web of Knowledge, IEEE Xplore, and INFORMS (approximately 11,000 journal articles) is used to prepare content collection. Latent Semantic Analysis (LSA) is applied as the review and knowledge extraction methodology. Using the text analysis and mining method we can combine statistical methods and expert human judgment to extract knowledge in the form of key latent factors. The LSA based analysis gives the study a scientific grounding which helps to overcome the
subjectivity of collective opinion about the trends. This approach allows proposing taxonomy of the research on power influences in supply chain. The adopted systems approach is used to find research gaps in each class of taxonomy. An emerging trend is noticed in the research of behavioral operations in supply chain. Understanding such a scholarly structure and future trends will assist researchers to assimilate the divergent developments of this multidisciplinary research in one place. This review will be beneficial for practitioners as they consider behavioral aspects in decision making. We have also studied articles related to supply chain published in Expert Systems with Applications (ESWA) journal. We have speculated what an ESWA-related community would like to see in future publications. This will encourage researchers to explore the recommended areas and publish to these outlets.

D. My Favorite Paper

For each newsletter I ask an accomplished researcher in our field to present one of their favorite works, one they think is worth taking a look at. This may be a paper, chapter or book and may be their ‘favorite’ in any way they wish to define it. It should be loosely related to behavioral operations and not written by them. The column will include a short introduction to the guest editor, a citation to the paper and abstract and a description by the guest editor of why the paper is his or her favorite. I hope you enjoy the feature. I encourage nominations for future guest editors for this column.

For this newsletter I am glad to welcome Dr. Dr. Gary Bolton the O.P. Jindal Chair of Managerial Economics at UT Dallas. Dr. Bolton is a graduate of Drew University, UC Berkeley and Carnegie Mellon. He has a distinguished career in Behavioral Economics and has made important contributions in decision making, negotiation, reputation and bargaining. He has also won multiple MBA teaching awards. You might want to look up his History Channel Documentary “Seven Deadly Sins: Greed.”

Have you ever heard of “match day?” It’s the third Friday of March and it’s the day new doctors, of the medical variety, find out where they will be doing their residency. Did you ever wonder how that “match” was made?


As we in behavioral operations management move our basic research towards practical implementation, Alvin and Peranson provide inspiration and how-to guidance. Perhaps the most instructive guidance is on how to think of the relationship between basic research and real world problem solving. The authors address this point best and I will open with a direct quote from the paper:

“A rough analogy may be helpful … Consider the design of suspension bridges. The Newtonian physics they embody is beautiful both in mathematics and in steel, and college students can be taught to derive the curves that describe the shape of the supporting cables. But no bridge could be built based only on this elegant theoretical treatment, in which the only force is gravity, and all beams are perfectly rigid. Real bridges are built of steel, and rest on rock and soil and water, and so bridge design also concerns metal fatigue, soil mechanics, and the force of waves and wind. Many design questions concerning these real world complications cannot be answered analytically, but must be explored using physical or computational models. Often these involve estimating magnitudes of phenomena missing from the simple Newtonian model, some of which are small enough to be of little consequence, while others will cause the bridge to fall down
if not adequately addressed. And so, just as no suspension bridges could be built without an understanding of the underlying physics, neither could any be built without understanding many additional features, also physical in nature, but more varied and complex than addressed by the simple model.”

Some of my favorite papers concern the study of matching markets, markets in which buyers and sellers submit their preferences to a centralized clearing house that then sets the actual trades – ‘the match’ in market parlance. A number of important markets are organized this way, including matching new physicians with hospitals, matching students with schools, and matching kidney donors with recipients. In all cases, there are either strategic or practical or institutional problems with decentralized exchange. These are also markets where price is either not an issue or of secondary importance to the traders, and so matching is done independent of price considerations.

The paper I highlight here represents what I would say is the culmination of the first phase of matching market research. It’s an eloquent example of how basic research - in this case theory - can work together with engineering methods - in this case simulation/computational experiments - to redesign a market for the purpose of making it work better.

The paper reports on the redesign of the matching mechanism used by the National Resident Matching Program (NRMP). Each year, the NRMP matches approximately 20,000 graduating physicians with residency programs throughout the United States. Both job applicants and residency programs submit a Rank Order List (ROL) to the NRMP (residency programs also submit the number of positions they are looking to fill). The NRMP then runs a matching algorithm on the submitted ROLs to determine the match. The NRMP, started in the 1950’s, was considered largely successful for many years. But a controversy broke out in the 1990s, with many medical students questioning whether the NRMP algorithm was overly favorable to residency programs and whether it could be gamed by submitting an ROL different from the job applicant’s true preferences.

The original NRMP algorithm closely tracked a simple theory of market matching developed by David Gale and Lloyd Shapley. The theoretical algorithm suggested a reason for why the NRMP – who had developed their algorithm independently from Gale and Shapley, had been successful for such a long time; namely, that it produced ‘stable’ matches. For any matched job applicant \(X\), any programs they preferred to the one given them by NRMP were all matched with applicants the program prefers to \(X\). The same held for programs and the applicants that they prefer to the match. That is, no one in the market can go outside the match they were given and find a trading partner who would prefer them.

Some of the most recent features of the NRMP were harder to evaluate using the simple theory. An important example was the then relatively recent phenomenon of married couples in the job applicant pool. In the 1980s, the NRMP had been changed to accommodate their needs for two positions close to one another. After the changes to the match algorithm, many of the conclusions reached by simple theory, as it applied to simple (theoretical) markets, no longer applied.

Most of the paper is given over to how the authors went about modifying the NRMP to address the complaints leveled at it by the 1990s job applicants. The NRMP employed a ‘program proposing’ version of the algorithm. The simple theory implied that this version produced stable matches that were most beneficial to the programs. The same theory suggested that switching to an ‘applicant proposing’ version of the algorithm would produce matches more favorable to job applicants. The authors developed an applicant-proposing version of the NRMP. The new algorithm would be used in a more complex market than that to which the theory applied so the authors turned to computation experiments to learn how the new algorithm would likely perform. They were able to show that neither the original NRMP nor the new algorithm was particularly susceptible to strategic manipulation through submitting ROLs that differed from true preferences.

An important question was the extent to which the new procedure would create matches different from the original. The simple theory implied that the difference could be quite substantial, particularly in a market the size
the of the NRMP. A key point uncovered in the investigation was that, in preparing their ROLs, both job applicants and programs were limited to those they had already interviewed in person, and that for practical reasons, the number possible interviews was substantially smaller than the size of the market. When this was taken into account, the set of stable matches reduced dramatically and suggested that the new algorithm would produce different results from the original algorithm for only a small percentage of job applicants. This did not mean the resulting welfare improvements for job applicants would be small. As the authors explain,

“Indeed, in the debate that led to this study, and after our report was circulated to the interested parties, a great deal of discussion stemmed from the view that the difference in welfare was likely to be large for the affected applicants, and likely to be small for the affected programs. This contributed to the decision to adopt the applicant proposing algorithm, a decision strongly lobbied for by the student organizations, and eventually unanimously adopted by the NRMP Board.”

This is a remarkable paper along many dimensions. It solves an interesting and important practical problem and gives us an excellent example of how to mix theory and practice. And if that’s not enough, watch this: https://youtu.be/DJhSwVhD-Ik

Gary Bolton grew up outside of Syracuse NY.