MAY-JUNE 2008 RESEARCH REPORT
COLLEGE OF MANAGEMENT
NC STATE UNIVERSITY

Newly accepted refereed journal articles

Paul Bergey and **Sangkil Moon**, "Conditional Efficiency, Operational Risk and Electronic Ticket Pricing Strategies for the Airline Industry," *International Journal of Electronic Marketing and Retailing*

As the United States moves toward an economic slowdown and possible recession, the airline industry is particularly vulnerable to consumer price sensitivity regarding the purchase of electronic tickets. In this research, we provide a methodological approach that utilizes operational risk metrics to examine the impact of various electronic ticket pricing strategies on profitability. Specifically, the work presented herein is differentiated from previous airline revenue management studies in the following ways: 1. We develop a Monte-Carlo simulation model which can be used effectively to construct conditionally efficient discount ticket pricing strategies. 2. We show that operational value at risk and expected shortfall are effective measures for weighing the risk-return trade offs for efficient discount ticket pricing strategies along the constructed frontier. 3. We implement a demand recapturing variable in the simulation model where prior studies have assumed independent demand among various consumer classes.

Bozarth, C. C., **D. P. Warsing**, B. B. Flynn, and J. E. Flynn, "The Impact of Supply Chain Complexity on Manufacturing Plant Performance," *Journal of Operations Management*

This paper puts forth a model of supply chain complexity and empirically tests it using plant-level data from 209 plants across seven countries. The results show that upstream complexity, internal manufacturing complexity, and downstream complexity all have a negative impact on manufacturing plant performance. Furthermore, supply chain characteristics that drive dynamic complexity are shown to have a greater impact on performance than those that drive only detail complexity. In addition to providing a definition and empirical test of supply chain complexity, the study serves to link the systems complexity literature to the prescriptions found in the flexibility and lean production literatures. Finally, this research establishes a base from which to extend previous work linking operations strategy to organization design (Flynn and Flynn, 1999).

Handfield, R. B., D. P. Warsing, and X. Wu, "(Q,r) Inventory Policies in a Fuzzy Uncertain Supply Chain Environment," *European Journal of Operational Research*

Managers have begun to recognize that effectively managing risks in their business operations plays an important role in successfully managing their inventories. Accordingly, we develop a (Q,r) model based on fuzzy-set representations of various sources of uncertainty in the supply chain. Sources of risk and uncertainty in our model include demand, lead time, supplier yield, and penalty cost. The naturally imprecise nature of these risk factors in managing inventories is represented using triangular fuzzy numbers. In addition, we introduce a human risk attitude factor to quantify the decision maker's attitude toward the risk of stocking out during the replenishment period. The total cost of the inventory system is computed using defuzzification methods built from techniques identified in the literature on fuzzy sets. Finally, we provide numerical examples to compare our fuzzy-set computations with those generated by more traditional models that assume full knowledge of the distributions of the stochastic parameters in the system.

Kay, M. G. and **D. P. Warsing**, "Modeling Truck Rates Using Publicly Available Empirical Data," *International Journal of Logistics*

We develop a shipper-oriented model to estimate less-than-truckload (LTL) truck rates for transporting goods between origin-destination (O-D) pairs located anywhere in the continental United States. The rate estimate is developed from internet-accessible tariff tables and allows straightforward computation of optimal shipment sizes (minimizing total logistics costs) and comparison to the total cost of other modes. The model uses publicly available nominal rates along with a characterization of the distribution of LTL shipments, based on other publicly available data, to determine a rate that also accounts for the estimated industry average discount from the nominal rate. We use nonlinear regression to build the estimate, with tariff-based rates serving as the dependent variable and load density, shipment weight, and O-D pair distance as the explanatory variables. The model is normalized to reflect average industry rates and to reflect current economic conditions using the Producer Price Index for LTL service. Although our results are specific to U.S. markets for truck freight, the method of analysis serves as a model for similar international studies.

Thomas, Douglas J., **Donald P. Warsing**, and Xueyi Zhang, "Forecast Updating and Supplier Coordination for Complementary Component Purchases," *Production and Operations Management*

We study a supply chain where an Original Equipment Manufacturer (OEM) buys subassemblies from a contract manufacturer (CM). The subassemblies are comprised of two complementary sets of components with different lead times. The OEM provides a demand forecast at the time when the CM must order the long lead time set of components, but must decide whether or not to provide updated forecasts as a matter of practice. Updated forecasts would affect the CM's purchase decision for the short lead-time components, and the anticipation of updated forecasts may also affect the purchase decision for the long lead-time components. While the OEM and CM both incur a lost sales cost if demand is not fully satisfied, the OEM can decide whether or not to share the component overage costs that the CM would otherwise fully bear. We use this model of the CM's procurement decisions to investigate when it is in the best interest of the OEM to commit to providing updated forecasts and/or commit to sharing component overage costs. For a distribution-free, two-stage forecast update model, we show (1) that the practice of providing forecast updates may be harmful to the OEM, and (2) at the OEM's optimal levels of component risk sharing, the CM will undersupply relative to the supply chain optimal quantity. We then present a specific forecast-update model and computationally investigate conditions under which forecast updating and risk sharing are in the best interest of the OEM.

Tyler, Beverly, and Gnyawali, D.R., “Managerial Collective Cognitions: An Examination of Similarities and Differences of Cultural Orientations,” *Journal of Management Studies*

Using the context of market orientation, we examine how an exemplary business’s market orientation culture is reflected in managers’ mental models, evaluate how mental models and perceived behaviors differ across hierarchical levels and functions, and compare the cognitive values and beliefs or the cognitive aspects of market orientation culture with behavioral aspects. Results from a rich, multi-method, case study suggest that while managers in the business share core beliefs regarding the customer dimension of market orientation, their beliefs regarding competitors, technology, and inter-functional coordination dimensions vary widely across the levels and functions of the business. We found differences in terms of both the integration between the four dimensions of market orientation and the depth of knowledge within the dimensions. Our findings reveal that customer rather than competitor beliefs are the most important commonly shared beliefs in successful companies, leading us to encourage cognitive researchers to move beyond competitor analysis when examining managerial cognition. Another implication for future research is that a strong market orientation implies common core beliefs regarding customer dimensions but does not imply that all beliefs will be or should be shared.

From the methodological standpoint, we find that cognitive mapping techniques provide rich insights into a business's market orientation culture that are not gained from behavioral methods alone.

Publications

Rob Handfield, "The Key to Strategic Sourcing," *Inside Supply Management,* August 2008, pp. 12-14.

Charles Jones, "How Important is the P/E Ratio in Determining Market Returns?" The Journal of Investing, Vol. 17, No. 1, Summer 2008, pp. 7-14.

Presentations

Mehmet Caner made the following presentations:

1. Invited Speaker, Nonlinear Time Series Conference: Xiamen University, China, May 7-10. Paper:"No country for Old unit Root tests: Bridge estimators can differentiate between nonstationarity and stationarity and select the optimal lag" (joint work with K. Knight, Univ. of Toronto)

2. Paper presenter: SETA 2008, Seoul National University,"Local GEL Estimators" , may 22-26. (joint with R.J. Smith, Cambridge University,UK)

3.Invited, TOBB-ETU University, June 19, Economics Seminar, Ankara, Turkey, "Capital Inflows to Developed Countries" (joint with S. Husted, Univ. of Pittsburgh)

4. World Congress, International Economic Association, Istanbul, Turkey, June 25-29, Paper presenter, same paper as point 3.

5. Media presentation: CNBC-E TV channel in Turkey , June 26, discussion of US Int. rates (summary of paper 3)

Kay, M. G. and **D. P. Warsing**, "Distributed Shipment Consolidation," International Material Handling Research Conference, Dortmund, Germany, June 2008.

Kay, Michael G. and **Donald P. Warsing**, "Comparing Distributed and Joint Consolidation Approaches to Building Shipment Loads," 19th Annual Conference of the Production and Operations Management Society, La Jolla, CA, May 2008.

Warsing, D. P. and M. G. Kay, "A Savings-based Shipment Consolidation Algorithm," INFORMS Manufacturing and Service Operations Management Conference, College Park, MD, June 2008.

Other recognition

David Baumer, Wade Chumney and Roby Sawyers, “Patents Gone Wild: an Empirical Examination and Policy Analysis of Tax-Related and Tax Strategy Patents,” has been selected as a finalist for the Holmes-Cardozo best paper award at the annual conference of the Academy of Legal Scholars in Business (ALSB) in August at Long Beach, CA. The paper will be published in the Proceedings of the ALSB Conference.