OPRE 7372. Advanced Topics in Supply Networks - Syllabus

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  Office hours: 4-6 pm on T and R at S0M3.408.
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- Course Objective: Supply Networks (SN) are concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. The course studies models that explore the key issues associated with the design and management of SNs. One of the key issues in SN is to minimize total costs subject to various service requirements, such as leadtimes, product availability, quality. A special attention will be given to integration of supply chain decisions and consequential difficulties. A considerable portion of the course is devoted to models that treat uncertainty explicitly. Topics include supply network design, inventory centralization, multistage production systems, value of information, and contracts.
- Prerequisites: OPRE 6201, OPRE 6330, OPRE 6366 or consent of the instructor.
- Target Audience: The course is designed primarily for second and third year Ph.D. students in SOM. For junior Ph.D. students, the course can provide a smooth transition from a course taking mode to a research mode. It can especially give ideas for research papers.
- Main book: Quantitative Models for Supply Chain Management. Edited by S. Tayur, R. Ganeshan and M. Magazine. Sixth print by Kluwer Academic Publishers, 2003. A library copy is requested on Aug 8.
- Supplementary books:
  - Supply Chain Management: Strategy, Planning and Operation. By Sunil Chopra and Peter Meindl. First edition published by Prentice-Hall, Inc., 2001. Designing and managing the supply chain: concepts, strategies, and case studies. By David Simchi-Levi, Philip Kaminsky and Edith Simchi-Levi. 1. edition published by McGraw-Hill, 2000. HF5415.7.S425 at the Library.
  - Conceptual logistics focus: The Management of Business Logistics. By John Coyle, Edward Bardi and John Langley. 1. edition published by Thomson, 2003. ISBN 0-324-00751-5.
  - Supply chain design and management: Strategic and tactical perspectives. By Manish Govil and Jean-Marie Proth. 1. edition published by Academic Press, 2002. ISBN 0-12-294151-9.
  - For purchasing and contracting focus: Purchasing and supply chain management. By Robert Monczka, Robert Trent and Robert Handfield. 2. edition published by South-Western, 2002. ISBN 0-324-02315-4.
  - For linear programming type modelling and finance focus: Modeling the supply chain. By Jeremy F. Shapiro. 1. edition published by Pacific Grove, 2001. TS161.S485 at the Library.
  - Business logistics management. By Ronald H. Ballou. 4. edition published by Prentice-Hall, Inc., 1999.
- Internet: Course web page can be reached via www.utdallas.edu/∼metin/teaching.html with the course password ..... .

- Grading:
  - 5% * Active class participation — including Friday OM seminars.
  - 20% * Homeworks: There will be 4-5 homeworks. You may discuss homework problems with others, but you must write up by yourself with the full understanding of what you write. Students handing in identical assignments will be violating university regulations. Late homeworks are not allowed unless you negotiate with the instructor at least one day in advance.
  - 20% * Quiz on Oct 8.
  - 16% * Four paper evaluations from the paper list: A critical discussion of a paper in the form of a referee report. A reasonable format for 1-2 page report will be provided. These reports will be collected and redistributed to all students so that students can later on quickly revise each paper without much effort.
  - 14% Two paper presentations from the paper list: This is not merely presentation/reiteration of the results in a paper. Students are advised to provide a critical discussion of the paper. They must outline pros and cons of the approach in the paper, contributions and limitations of the paper.
  - 5+15+5% * Term paper proposal + Term paper + Presentation. Term paper is expected to be a high quality publishable research paper. The senior PhD students who have already completed a couple of papers, **cannot** use an existing paper to fulfill this requirement. The work which started earlier but requires substantial amount of conceptual work satisfies this requirement. Students in doubt should check with the instructor at the beginning of the semester. Students can work in groups of 2 or 3 for a single paper. In that case, each group member will be asked to evaluate other members' contribution at the end of the semester. The course aims to provide new research topics for PhD students. This aspect will be very useful to the 2. and 3. year PhD students. Term paper proposals are due to September 24. Proposals must have abstract, introduction, literature review and future plans sections.
- Auditing students are required to participate in the class and present two papers to receive a "Pass" grade.
- Guest lecture: Purchasing via Group Buying by E. Özelkan.
- No class on Oct 22 because of the Informs conference.

COURSE OUTLINE

- Lectures and papers:

1. Introduction to SNs: An informal summary of SN issues.
2. Preliminaries.
   (a) Convex sets and functions, and convexity preserving transformations.
   (b) Useful inequalities.
   (c) 1-period stochastic demand inventory model: Newsvendor problem and its variations
      i. Multi-product version with capacity limitations. Lecture notes. Excel worksheet.
      ii. Pricing. N. Petruzzi and M. Dada. *Pricing and the newsvendor problem.* Operations Research 1999 Vol.47 No.2: 183-194.
   (d) Continuous time inventory models
      i. Deterministic demand: EOQ problem and its variations.
      ii. Stochastic demand: (R,Q) Policy. Detailed discussion from Zipkin's Inventory book.
         A. Construction of the cost function.
         B. Zipkin's ManSci convexity paper.
         C. Y. Zheng. *On properties of stochastic inventory systems.* Management Science 1992 Vol.38 No.1: 87-103.
         D. G.Gallego's ManSci Approximation paper and H.Scarf's *A Min-Max solution of an inventory problem.*
   (e) Discrete time inventory models
      i. Deterministic demand: Wagner-Whitin approach.
      ii. Stochastic demand: (s,S) Policy. Detailed discussion in Prof. Sethi's course.
      iii. (s,S) and (R,Q) under Poisson demand.
3. Logistics Network Configuration
   (a) * S. J. Erlebacher and R. D. Meller, The interaction of location and inventory in designing distribution systems, IIE Transactions, 32, 155-166 (2001)
   (b) * M. S. Daskin and C. R. Coullard, An inventory-location model: formulation, solution algorithm and computational results, Annals of Operations Research, 110, 83-106 (2002)
   (c) * C. P. Teo, J. Ou and M. Goh, Impact on inventory costs with the consolidation of distribution centers, IIE Transactions, 33, 99-110 (2000)
4. Guest lecture: Purchasing via Group Buying. by E. Özelkan Oct 15.
5. Multistage Production Systems
   (a) J.A. Muckstadt and R.O. Roundy. *Analysis of Multistage Production Systems* in Logistics of Production and Inventory edited by S.C. Graves et al: 59-138.
   (b) Chapter 2 of Tayur et al.
6. Inventory Management and Risk Pooling
   (a) * G. P. Eppen, Effects of centralization on expected costs in a multi-location newsboy problem, Management Science, 25, 498-501 (1979)
   (b) * L. B. Schwarz, A model for assessing the value of warehouse risk-pooling: risk pooling over outside-supplier lead times, Management Science, 35, 828-842 (1989)
7. The Value of Information
   (a) * H. Lee, P. Padmanabhan, S. Whang, Information distortion in a supply chain: the bullwhip effect, Management Science, 43, 546-558 (1997)

(b) * F. Chen, Z. Drezner, J. K. Ryan and D. Simchi-Levi, Quantifying the bullwhip effect in a simple supply chain: the impact of forecasting, lead times and information, Management Science, 46, 436-443 (2000)

(c) * H. Lee, K. C. So and C. S. Tang, The value of information sharing in a two-level supply chain, Management Science, 46, 626-643 (2000)

(d) * G. P. Cachon and M. Fisher, Supply chain inventory management and the value of shared information, Management Science, 46, 1032-1048 (2000)

(e) G.P. Cachon and M. Fisher, (1999) Supply chain inventory management and the value of shared information, Fuqua School of Business working paper.

(f) * Mukhopadhyay, T., Rajiv, S. and Srinivasan, K. (1997). Information technology impact on process output and quality. Management Science December.

(g) * Alles, M., Amin, A., Datar, S., and Sarkar, R. (2000). Information and Incentives of inventory in JIT production. Management Science, 46:12.

(h) * C. J. Corbett and X. de Groote, A suppliers optimal quantity discount policy under asymmetric information, Management Science, 46, 444-450 (2000)

8. Distribution Strategies

(a) * M. L. Spearman, Customer service in pull production systems, Operations Research, 40, 948-958 (1992)

(b) * S. Rajagopalan, Make to order or make to stock: model and application, Management Science, 48, 241-256 (2002)

(c) * K. L. Cheung and H. L. Lee, The inventory benefit of shipment coordination and stock rebalancing in a supply chain, Management Science, 48, 300-306 (2002)

(d) * S. Cetinkaya and L. Chung-Yee, Stock replenishment and shipment scheduling for vendor-managed inventory systems, Management Science, 46, 217-232 (2000)

9. Strategic Alliances

(a) * G. D. Eppen and A. V. Iyer, Backup agreements in fashion buying: value of upstream flexibility, Management Science, 43, 1469-1484 (1997)

(b) * Z. K. Weng, Channel coordination and quantity discounts, Management Science, 41, 1509-1522 (1995)

(c) * H. L. Lee and S. J. Whang, Decentralized multi-echelon supply chains: incentives and information, Management Science, 45, 633-640 (1999)

(d) * V. Iyer and M. E. Bergen, Quick response in manufacturer-retailer channels, Management Science, 43, 559-570 (1997)

(e) * Y. Bassok and R. Anupindi, Analysis of supply contracts with total minimum commitment, IIE Transactions, 29, 373-381 (1997)

(f) * K. Moinzadeh and S. Nahmias, Adjustment strategies for a fixed delivery contract, Operations Research, 48, 408-423 (2000)

(g) * K. L. Donohue, Efficient supply contracts for fashion goods with forecast updating and two production modes, Management Science, 46, 1397-1411 (2000)

10. Coordinated Product and Supply Chain Design

(a) * H. L. Lee, Effective inventory and service management through product and process redesign, Operations Research, 44, 151-159 (1996).

(b) * H. L. Lee and C. Tang, Modeling the costs and benefits of delayed product differentiation, Management Science, 43, 40-53 (1997)

(c) * Y. Aviv and A. Federgruen, Design for postponement: a comprehensive characterization of its benefits under unknown demand distributions, Operations Research, 49, 578-598 (2001)

11. Competition of many firms to sell inventories to the same customer population

(a) * J. Bryant. Competitive equilibrium with price setting firms and stochastic demand, International Economic Review, 21, 619-626 (1980)

(b) * M. Parlar. Game theoretic analysis of the substitutable product inventory problem with random demands. Naval Research Logistics 35, 397-409(1988).

Paper listinclude any * paper above, any paper under unpublished papers section of the course web page or any MSOM paper listed below.

- MSOM SN papers

1. Fill-Rate Bottlenecks in Production-Inventory Networks. Manufacturing & Service Operations Management, Jan99, Vol. 1 Issue 1, p62, 15p. By Glasserman, Paul; Wang, Yashan.
   Abstract:We consider systems in which various components are produced through a series of stages holding intermediate inventories and are then assembled into finished goods to meet external demands. With each station in the network we associate precise measures of the stations propensity to constrain the fill rate. We call a station with a minimal measure a fill-rate bottleneck and justify this label both theoretically and numerically. Examples show that even the least utilized facility can be a fill-rate bottleneck. Unlike utilization, our bottleneck criteria capture information about process variability.
2. Stock Positioning and Performance Estimation in Serial Production-Transportation Systems. Manufacturing & Service Operations Management, Jan99, Vol. 1 Issue 1, p77, 12p. By Gallego, Guillermo; Zipkin, Paul.
   Abstract: This paper considers serial production-transportation systems. In recent years, researchers have developed a fairly simple functional equation that characterizes optimal system behavior, under the assumption of constant leadtimes. We show that the equation covers a variety of stochastic-leadtime systems as well. Still, many basic managerial issues remain obscure: When should stock be held at upstream stages? Which system attributes drive overall performance, and how? To address these questions, we develop and analyze several heuristic methods, inspired by observation of common practice and numerical experiments. One of these heuristics yields a bound on the optimal average cost. We also study a set of numerical examples, to gain insight into the nature of the optimal solution and to evaluate the heuristics.
3. Quantity Flexibility Contracts and Supply Chain Performance. Manufacturing & Service Operations Management, Feb99, Vol. 1 Issue 2, p89, 23p. By Tsay, A. A.; Lovejoy, W. S.
   Abstract: The Quantity Flexibility (QF) contract is a method for coordinating materials and information flows in supply chains operating under rolling-horizon planning. It stipulates a maximum percentage revision each element of the period-by-period replenishment schedule is allowed per planning iteration. The supplier is obligated to cover any requests that remain within the upside limits. The bounds on reductions are a form of minimum purchase commitment which discourages the customer from overstating its needs. While QF contracts are being implemented in industrial practice, the academic literature has thus far had little guidance to offer a firm interested in structuring its supply relationships in this way. This paper seeks to address this need, by developing rigorous conclusions about the behavioral consequences of QF contracts, and hence about the implications for the performance and design of supply chains with linkages possessing this structure. Issues explored include the impact of system flexibility on inventory characteristics and the patterns by which forecast and order variability propagate along the supply chain. The ultimate goal is to provide insights as to where to position flexibility for the greatest benefit, and how much to pay for it.
4. Optimizing Strategic Safety Stock Placement in Supply Chains. Manufacturing & Service Operations Management, Jan2000, Vol. 2 Issue 1, p68, 16p. By Graves, Stephen C.; Willems, Sean P.; Zipkin, Paul.
   Abstract: Examines the development of a tool to help cross-functional teams in efforts to model and improve supply chain. Formulation of an optimization algorithm for the placement of strategic safety stock for supply chains; Application of the model to reduce finished goods inventory; Difficulties of manufacturing managers in the supply chain.
5. Responsibility Tokens in Supply Chain Management. Manufacturing & Service Operations Management, Apr2000, Vol. 2 Issue 2, p203, 17p. By Porteus, Evan L.
   Abstract: The decentralized supply chain management scheme of Lee and Whang (1999) can be viewed as operationalizing the decentralized management scheme implicit in Clark and Scarf (1960). This paper proposes the use of what are called responsibility tokens (RTs) to further

facilitate that operationalization. The proposal assumes that a management information system, presumably electronic, is established to monitor inventories and shipment quantities, and to carry out transfer payments between players. As in Lee and Whang (1999), the incentives of the system are aligned, so if each player is brilliantly self-serving, the system optimal solution will result. While the system administrator need not know how the system should be managed, the most upstream player must know how to manage the system optimally for the system optimal solution to be achieved. RTs endow the system with an attractive self-correcting property: An example illustrates that upstream players are given a mechanism and the incentive to correct for downstream over-ordering. The downstream players who over-order are penalized, but system performance is not degraded much. Extensions and further research are also discussed.

6. Contract Assembly: Dealing with Combined Supply Lead Time and Demand Quantity Uncertainty. Manufacturing & Service Operations Management, Jul2000, Vol. 2 Issue 3, p287, 10p. By Song, Jing-Sheng; Yano, Candace A.; Lerssrisuriya, Panupol.
   Abstract: We consider a problem faced by a contract assembler that both assembles finished goods and procures the associated component parts for one of its major customers. Because of rapid changes in technology and ongoing engineering changes, all parts subject to obsolescence are purchased only for the current customer order. The procurement lead times of the components are random. Moreover, although the order for the finished product has a defined due date, the contract allows the customer to change the order quantity. Consequently, the assembler also faces a random demand. The assembler must determine how much to order and when to order each component part. The objective is to minimize the total expected cost, including the cost of holding components prior to their assembly, penalties for tardiness vis-a-vis the assembly due date, and overage and underage costs in satisfying the demand quantity. We present some structural results and discuss insights regarding optimal policies. We also present several simple heuristic policies and compare them to optimal policies. Computational results indicate that ignoring lead time variability can be costly, but relatively simple heuristics that consider lead time variability perform quite well. (Inventory/Production; Multi-item; Optimal Policies; Stochastic Models)

7. Optimizing Delivery Fees for a Network of Distributors. Manufacturing & Service Operations Management, Jul2000, Vol. 2 Issue 3, p297, 20p. By Balakrishnan, Anantaram; Natarajan, Harihara Prasad; Pangburn, Michael S.
   Abstract: The third-party logistics industry has grown rapidly in recent years, accounting for $46 billion of the total $921 billion in logistics spending in the United States during 1999. This figure is expected to grow by 15 to 20

8. Supply Contract Competition and Sourcing Policies. Manufacturing & Service Operations Management, Oct2000, Vol. 2 Issue 4, p350, 22p. By Elmaghraby, Wedad J.
   Abstract: Advances in information technology have opened new venues for companies to create flexible supply chains by offering high-speed communication and tight connectivity. A growing number of companies are taking advantage of new opportunities to outsource portions of their production and other operations. Given the importance of the supplier selection process in the ultimate success of a product, a purchasing manager must understand the different sourcing strategies that she or he can use and the suitability of each sourcing arrangements for her or him. This paper provides an overview of the research that has been done in the fields of operations research and economics on the topic of sourcing strategies. In aggregate, this paper provides a blueprint of what market characteristics can heavily influence a buyer-supplier relationship and, hence, are important to identify and incorporate into the supplier selection process.

9. Impact of Uncertainty and Risk Aversion on Price and Order Quantity inthe Newsvendor Problem. Manufacturing & Service Operations Management, Oct2000, Vol. 2 Issue 4, p410, 14p. By Agrawal, Vipul; Seshadri, Sridhar.
   Abstract: We consider a single-period inventory model in which a risk-averse retailer faces uncertain customer demand and makes a purchasing-order-quantity and a selling-price decision with the objective of maximizing expected utility. This problem is similar to the classic newsvendor

problem, except: (a) the distribution of demand is a function of the selling price, which is determined by the retailer; and (b) the objective of the retailer is to maximize his/ her expected utility. We consider two different ways in which price affects the distribution of demand. In the first model, we assume that a change in price affects the scale of the distribution. In the second model, a change in price only affects the location of the distribution. We present methodology by which this problem with two decision variables can be simplified by reducing it to a problem in a single variable. We show that in comparison to a risk-neutral retailer, a risk-averse retailer in the first model will charge a higher price and order less; whereas, in the second model a risk-averse retailer will charge a lower price. The implications of these findings for supply-chain strategy and channel design are discussed. Our research provides a better understanding of retailers' pricing behavior that could lead to improved price contracts and channel-management policies.

10. Consequences of Order Crossover Under Order-Up-To Inventory Policies. Manufacturing & Service Operations Management, Jul2001, Vol. 3 Issue 3, p175, 14p By Robinson, Lawrence W.; Bradley, James R.; Thomas, L. Joseph.
    Abstract: O rder crossover occurs whenever replenishment orders do not arrive in the sequence in which they were placed. This paper argues that order crossover is becoming more prevalent and analyzes the dangers of ignoring it. We present an exact iterative algorithm for computing the distribution of the number of orders outstanding, and formulae for the inventory shortfall distribution (the quantity of inventory in replenishment at the start of a period) and the more common lead-time demand distribution, which are different when order crossover is possible. The lead-time demand distribution can have much higher vari-ability than the shortfall distribution. We show that basing inventory policies on the lead-time demand distribution–rather than the shortfall distribution–can lead to significantly higher inventory cost, even if the probability of order crossover is small. We give an alter-native proof to that of Zalkind (1976), which shows that the variance of shortfall is less than the variance of the standard lead-time demand.
11. Managing a Retailer's Shelf Space, Inventory, and Transportation. Manufacturing & Service Operations Management, Jul2001, Vol. 3 Issue 3, p211, 19p By Cachon, Gerard.
    Abstract: R etailers must constantly strive for excellence in operations; extremely narrow profit mar-gins leave little room for waste and inefficiency. This article reports a retailer's challenge to balance transportation, shelf space, and inventory costs. A retailer sells multiple products with stochastic demand. Trucks are dispatched from a warehouse and arrive at a store with a constant lead time. Each truck has a finite capacity and incurs a fixed shipping cost, no matter the number of units shipped. There is a per unit shelf-space cost as well as holding and back-order penalty costs. Three policies are considered for dispatching trucks: a mini-mum quantity continuous review policy, a full service periodic review policy, and a mini-mum quantity periodic review policy. The first policy ships a truck when demand since the previous shipment equals a fixed fraction of a truck's capacity, i.e., a minimum truck utili-zation. The exact analysis of that policy is the same as the analysis of reorder point policies for the multiechelon problem with one-warehouse, multiple retailers, and stochastic demand. That analysis is not computationally prohibitive, but the minimum quantity level can be chosen with a simple economic order quantity (EOQ) heuristic. An extensive numerical study finds the following: Either of the two periodic review policies may have substantially higher costs than the continuous review policy, in particular when the warehouse to store lead time is short; the EOQ heuristic performs quite well; the minimum quantity policy's total cost is relatively insensitive to the chosen transportation utilization, and its total cost is close to a lower bound developed for this problem.
12. Optimizing Inventory Replenishment of Retail Fashion Products. Manufacturing & Service Operations Management, Jul2001, Vol. 3 Issue 3, p230, 12p By Fisher, Marshall; Rajaram, Kumar; Raman, Ananth.
    Abstract: W e consider the problem of determining (for a short lifecycle) retail product initial and replenishment order quantities that minimize the cost of lost sales, back orders, and obsolete inventory. We model this problem as a two-stage stochastic dynamic program, propose a heuristic, establish conditions under which the heuristic finds an optimal solution, and report results

of the application of our procedure at a catalog retailer. Our procedure improves on the existing method by enough to double profits. In addition, our method can be used to choose the optimal reorder time, to quantify the benefit of leadtime reduction, and to choose the best replenishment contract.

13. Information and Inventory Recourse for a Two-Market, Price-Setting Retailer. Manufacturing & Service Operations Management, Jul2001, Vol. 3 Issue 3, p242, 22p By Petruzzi, Nicholas C.
Abstract: We analyze the problemof determining inventory and pricing decisions in a two-period retail setting when an opportunity to refine information about uncertain demand is available. The model extends the newsvendor problem with pricing by allowing for multiple suppliers, the pooling of procurement resources, and more general informational dynamics. One contribution is the solution procedure: We show that all decisions (up to 7 in all, including recourse decisions)can be determined uniquely as a function of a surrogate first-period decision called the stocking factor. Hence, the two-period decision problemwith recourse reduces to a search for one decision variable. A second contribution is the policy implications:We .nd that the cost of learning is (1)a consequence of censored information because,on the margin, learning is free if full information is guaranteed; (2)measured in the form of an increased stocking factor;and (3) shared with the consumer in the form of a higher selling price when demand uncertainty is additive.A third contribution is the application of the results to three motivating examples:a market research problem in which a product is introduced in a test market prior to a widespread launch;a global newsvendor problem in which a seasonal product is sold in two different countries with nonoverlapping selling seasons;and a minimum-quantity commitment problem in which procurement resources for multiple purchases may be pooled.

14. Selling to the Newsvendor: An Analysis of Price-Only Contracts. Manufacturing & Service Operations Management, Oct2001, Vol. 3 Issue 4, p293, 13p, 3 charts, 1 graph By Lariviere, Martin A.; Porteus, Evan L.
Abstract: Focuses on a study which considered a simple supply-chain contract that manufacturers sell to retailers. Determinants of the wholesale price; Efficiency of the supply chain; Model formulation for the supply chain.

15. A Simple, Robust Leadtime-Quoting Policy. Manufacturing & Service Operations Management, Oct2001, Vol. 3 Issue 4, p321, 16p, 7 charts, 1 graph By Hopp, Wallace J.; Sturgis, Melanie Roof.
Abstract: Deals with a study which examined the leadtime-quoting polices to minimize average lead time subject to customer service constraints. Application of measures to customers in the same system; Performance measures from leadtime policy for various production systems; Characteristics of the leadtime-quoting problem.

16. Coordinating Independent Buyers in a Distribution System to Increase a Vendor's Profits. Manufacturing & Service Operations Management, Oct2001, Vol. 3 Issue 4, p337, 12p, 3 charts, 3 graphs By Qinan Wang.
Abstract: Develops a coordination strategy that provides a common incentive scheme to independent buyers in a distribution system and improves the profit of the vendors. Use of a numerical algorithm; Comparison of the proposed coordination strategy with the simple quantity-discount decision; Managerial issues for coordinating the replenishment time and order quantity of independent buyers.

17. A General Framework for the Study of Decentralized Distribution Systems*. Manufacturing & Service Operations Management, Oct2001, Vol. 3 Issue 4, p349, 20p, 7 charts By Anupindi, Ravi; Bassok, Yehuda; Zemel, Eitan.
Abstract: Presents a study which developed a general framework for the analysis of decentralized distribution systems. Concept of stocks sharing; Use of information technology in distribution; Role of common inventory in central warehouses with joint ownership.

18. Newsvendor Bounds and A Heuristic for Optimal Policies in Serial Supply Chains. Manufacturing & Service Operations Management, Jan2002, Vol. 4 Issue 1, p2, 3p By Shang, Kevin H.; Jing-Sheng Song

Abstract: Presents a study on newsvendor bounds and features a heuristic for optimal policies in serial supply chains. Method of the study; Results and discussion.

19. On the Benefits of Inventory-Pooling in Production-Inventory Systems. Manufacturing & Service Operations Management, Jan2002, Vol. 4 Issue 1, p12, 5p By Kim, Jon-Seok; Benjaafar, Saif.
Abstract: Presents a study which examined the benefits of inventory-pooling in production-inventory systems. Method of the study; Results and discussion; Conclusion.

20. The Value of Information Sharing in a Two-Stage Supply Chain with Production Capacity Constraints: The Infinite Horizon Case. Manufacturing & Service Operations Management, Jan2002, Vol. 4 Issue 1, p21, 4p By Yao Zhao; Simchi-Levi, David.
Abstract: Discusses the value of information sharing in a two-stage supply chain with production capacity constraints. Characteristics of a manufacturer's optimal production-inventory policy; Situations under which information sharing is most beneficial; Impact of frequency and timing in which demand information is shared on the manufacturer.

21. Gaining Benefits from Joint Forecasting and Replenishment Processes: The Case of Auto-Correlated Demand. Manufacturing & Service Operations Management, Jan2002, Vol. 4 Issue 1, p55, 20p By Aviv, Yossi.
Abstract: Presents a research paper which considers a cooperative, two-level supply chain consisting of a retailer and a supplier. Examination of three types of supply chain configurations; Suggestion of a set of stylized models to study the three settings addressed in the study, and use them to provide managerial insights into the value of information sharing and collaborative forecasting.

22. On the Complementary Value of Accurate Demand Information and Production and Supplier Flexibility. Manufacturing & Service Operations Management, Apr2002, Vol. 4 Issue 2, p99, 15p By Milner, Joseph M.; Kouvelis, Panos.
Abstract: We study the value of information, production flexibility, and supplier flexibility for a good for which an initial and a subsequent order may be placed. We consider a Bayesian model of demand in which the unknown mean demand rate is assumed to have a prior, which is a mixture of two normal distributions corresponding to the demand forecast for an innovative (fashion) good. We develop three models of production flexibility: a static model requiring initial placement of both orders, a partially dynamic model requiring a fixing of the time that the second order will be made, and a fully dynamic model with no restrictions on ordering. Supplier flexibility is modeled through supply lead times. We observe that the magnitude of the savings from the static to the fully flexible model, corresponding to the sum of the values of information and production flexibility, reflects all sources of variability: differences between demand means of the prior mixture, variability within each prior, and variability about the observed mean. We observe that as the difference between high and low demand cases increases, the value of information increases, though for long lead times, production flexibility is required to take advantage of the updated information. Further, we observe that the greater the uncertainty within each prior distribution, the greater the value of information relative to the value of production flexibility, particularly for long lead times. However, the greater the uncertainty around the mean demand, which is the uncertainty that cannot be resolved through observation, the lower the value of information. Finally, we observe that the value of supply flexibility grows initially in a concave then convex manner as a function of the supply lead times.

23. Coordination and Flexibility in Supply Contracts with Options. Manufacturing & Service Operations Management, Jul2002, Vol. 4 Issue 3, p171, 37p By Barnes-Schuster, Dawn; Bassok, Yehuda; Anupindi, Ravi.
Abstract: We investigate the role of options (contingent claims) in a buyer-supplier system. Specifically using a teo-period model with correlated demand, we illustrate how options provide flexibility to a buyer to respond to market changes in the second period. We also study the implications of such arrangements between a buyer and a supplier for coordination of the channel. We show that, in general, channel coordination can be achieved only if we allow the exercixe price

to be piecewise linear. We develop sufficient conditions on the cost parameters such that linear prices coordinate the channel. We derive the appropriate prices for channel coordination which, however, violate the individual rationality constraint for the supplier. Contrary to popular be lief (based on simpler models) we show that credit for returns offered by the supplier does not always coordinate the channel and alleviate the individual rationality constraint. Credit for returns are useful only on a subset of the feasibility region under which channel coordination is achievable with linear prices. Finally, we demonstrate (numerically) the benefits of options in improving channel performance and evaluate the magnitude of loss due to lack of coordination.

24. Design and Analysis of a Smart Market for Industrial Procurement. Manufacturing & Service Operations Management, Jan2001, Vol. 3 Issue 1, p2, 3p. By Jeremie Gallien, Lawrence M. Wein.
Abstract: Discusses the design and analysis of an online multi-item procurement and auction mechanism adapted to supply environments with production capacity constraints. Description of the mechanism structure for procurement contracts; Importance of the calculation of the myopic best response bid in the analysis of supply; Establishment of convergence bounds in the analysis of supply.

25. Coordinating Production and Delivery Under a (z, Z)-type Vendor-Managed Inventory Contract. Manufacturing & Service Operations Management, Jan2001, Vol. 3 Issue 1, p11, 3p. By Michael J. Fry, Roman Kapuscinski, Tava Lennon Olsen.
Abstract: Discusses the use of a vendor-managed inventory (VMI) agreement model between a single retailer and supplier to determine the benefits offered by coordinating production and delivery under VMI. Description of the VMI; Use of the VMI model based on direct experiences with VMI models; Characterization of the optimal policy of supplier and retailer operating under a VMI contract.

26. Serial Production/Distribution Systems Under Service Constraints. Manufacturing & Service Operations Management, Jan2001, Vol. 3 Issue 1, p43, 8p. By Tamer Boyaci, Guillermo Gallego.
Abstract: We analyze the problem of minimizing average inventory costs subject to fill-rate type of service-level constraints in serial and assembly production/distribution systems. We propose optimal and heuristic procedures to solve this problem. Our model and solution procedures can be used to manage the fill rate or fill rate within a "time window" service measures. We also relate our service-constrained model to the traditional model with backorder costs and show that it is possible to prespecify backorder cost rates to achieve desired service levels. We explore the inventory cost impact of such a practice, and we find that the cost penalty can be very high.

27. Supply Chain Coordination when Demand Is Shelf-Space Dependent. Manufacturing & Service Operations Management, Jan2001, Vol. 3 Issue 1, p82, 6p. By Yunzeng Wang and Yigal Gerchak.
Abstract: Consider a manufacturer or wholesaler who supplies some item to retailers facing demand rates that depend on the shelf or display space that is devoted to that product by themselves and their competitors. The manufacturer, via the use of financial levers at her disposal, wishes to coordinate this decentralized chain while making a profit. We model the physical scenario as one of constant displayed inventory level (on which demand rate depends positively) and continuous replenishment. With a single retailer, we show that to coordinate the channel and make a profit the manufacturer needs to augment the wholesale price lever by another– an inventory holding costs subsidy offered to the retailer. When multiple retailers compete in that product's market, there are two ways to envision and model the demand and market split. One assumes that market demand depends on aggregate inventory displayed, and then splits according to individual display levels. The other "assigns" customers to retailers according to their display levels, and then assumes that purchases are a function of the display level at the retailer selected. We characterize retailers' Nash equilibria in these models, and we explore whether the manufacturer can coordinate such channels.

28. Assessing the Benefits of Different Stock-Allocation Policies for a Make-to-Stock Production System. Manufacturing & Service Operations Management, Apr2001, Vol. 3 Issue 2, p105, 17p. By

Francis de Vericourt, Fikri Karaesmen, Yves Dallery.
Abstract: We consider a manufacturing facility that produces a single item that is demanded by several different classes of customers. The inventory-related cost performance of such a system can be improved by effective allocation of production and inventories. We obtain the optimal parameters for three easily implementable allocation policies. Our results cover the case of linear backorder costs as well as fill-rate constraints. We compare the optimal performance of these control policies to gain insights into the benefits of different production and stock-allocation rules.

29. Coordinating Production and Delivery Under a (z, Z)-Type Vendor-Managed Inventory Contract. Manufacturing & Service Operations Management, Apr2001, Vol. 3 Issue 2, p151, 23p. By Michael J. Fry, Roman Kapuscinski, Tava Lennon Olsen.
Abstract: This paper models a type of vendor-managed inventory (VMI) agreement that occurs in practice called a (z, Z) contract. We investigate the savings due to better coordination of production and delivery facilitated by such an agreement. The optimal behavior of both the supplier and the retailer are characterized. The optimal replenishment and production policies for a supplier are found to be up-to policies, which are shown to be easily computed by decoupling the periods when the supplier outsources from those when the supplier does not outsource. A simple application of the newsvendor relation is used to define the retailer's optimal policy. Numerical analysis is conducted to compare the performance of a single supplier and a single retailer operating under a (z, Z) VMI contract with the performance of those operating under traditional retailer-managed inventory (RMI) with information sharing. Our results verify some observations made in industry about VMI and show that the (z, Z) type of VMI agreement performs significantly better than RMI in many settings, but can perform worse in others.