Supply Chain Planning: Summary

• Review of intent, learning goals and approach
• Review of class sessions
Intent and learning goals

• Develop your understanding of supply chain phenomena and challenges
• Develop your modeling skills and tool kit, applicable to supply chain planning
• Learn tactics, concepts and countermeasures for supply chain improvement
Approach

• Models, frameworks and general principles for supply-chain conceptualization: how to think about supply chain challenges?
• Specific tools and software: how to develop a solution plan?
• Cases and applications: how to apply in practice?

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Overview

• Primary challenge: given uncertainty and constraints, how to design and plan a supply chain to meet certain goals?

• Types of uncertainty and constraints will vary with context

• Applicable counter-measures and tactics will vary with context
• Class 1: Introduction, Meditech
  – Supply chain dynamics with new product introduction
  – Supply chain challenges

• Class 2: Inventory Models
  – Two simple models, periodic review, order-up-to and continuous review, reorder point
  – Cycle stock set by order frequency or lot size
  – Safety stock depends on demand variability over replenishment lead time plus review period
  – Service measures: probability of stock-out in replenishment cycle vs. fill rate
• Class 3: Steel Works
  – Exercise of simple inventory models for analysis and diagnosis of inventory system
  – Opportunities for risk pooling from consolidating production and distribution

• Class 4 – 5: Supply Contracts
  – Sequential optimization leads to sub optimization
  – Contracts can move supply chain towards global optimum, facilitate risk sharing
  – Examples include buy back, revenue sharing, capacity reservation

• Guest Speaker, Mike Watson, LogicTool
  – Supply chain tactical planning in practice
• Class 6: Instron
  – Supply chain analysis of assembly system
  – Application of inventory and capacity models to size inventories and staff
  – Tactics – hold components, assemble to order
• Class 7: Multi Echelon Inventory Systems
  – Inventory models for risk pooling
  – Inventory models for postponement
  – Strategic inventory placement model
  – Reebok case – example of postponement
• Class 8: HP: Network Printer Design for Universality
  – Global supply chain for short-life-cycle products
  – Benefits of risk pooling from universality and localization
  – Different tactics for different phases of life cycle
• Class 9: Supply Chain Integration
  – Bullwhip phenomena: causes and remedies
  – Push-Pull boundary – key tactic in supply chain design
• Class 10: Safety Stock Placement in Supply Chains
  – Applications at HP – digital camera, ink jet pens
  – Where to de-couple: prior to product proliferation; prior to adding a lot of cost
  – Optimal placement depends on cost accumulation and lead times

• Class 11: HC Starck
  – Inventory tactics to reduce customer lead time
  – Intermediate de-coupling inventories, EOQ analysis for production cycle time
• Class 12: Supply Chain Integration
  – Application of RFID
  – Raytheon case study
  – Framework for evaluation of benefits

• Class 13: Strategic Partnering
  – Barilla case
  – Example of Bullwhip, VMI initiatives
Manufacturing System and Supply Chain Design: Summary

• Review of intent, learning goals and approach
• Review of class sessions
Intent and learning goals

• Develop your understanding of system design issues
• Develop your modeling skills and tool kit, applicable to system or network design
• Learn tactics, concepts, and approaches for system planning and design
Approach: Three Segments

• Manufacturing system design
• Supply chain planning and design
• Flexibility and capacity planning
Approach

• Models, frameworks and general principles for conceptualization of design issues and challenges
• Specific tools and software: how to develop a solution plan?
• Cases and applications: how to apply in practice?
• Class 1: Queuing Model for Lean Design
  – Application of queuing model for assembly system design, buffer sizing
  – Illustration of simple model to capture uncertainty and key tradeoffs
  – Model useful for building intuition
• Class 2: System Design: Queuing Models
  – Relevant queuing models and formulae for system design: M/M/1; M/M/k; M/G/k/k; M/G/∞
  – E.g.:
    \[ D = \frac{\rho}{1 - \rho} \left( \frac{1}{\mu} \right) \left( \frac{SCV_a + SCV_s}{2} \right) \]
  – Design issues for recovery area for marathon: various service systems
  – Design issues for design of PC factory: parallel vs. serial stations; kitting vs. line-side stocking; location of constraint
• Class 3: System Design: Manzana
  – Diagnosis of service system
  – Issues with dispatch rules; job release; incentives; load balance
  – Queuing model for predicting response times
• Class: Guest Speaker: Mitchell Burman
  – Description and analysis of transfer lines or flow lines
  – Role of buffers for increasing throughput in lines with unreliable machines
  – Bottleneck principles apply in design of transfer line
  – Application of models for design of transfer lines at HP
• Class 4 - 5: Supply Chain Design
  – Typical network design study
  – Issues – customer aggregation; product aggregation; cost modeling; demand modeling
  – Solution strategies – optimization; modeling software
  – Hub and spoke strategies and system designs
  – Buy.Com case study
  – MetalWorks Case – opportunity to do it yourself

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• Class 6: Decentralized Distribution Systems
  – Centralize or not?
  – Diagnosis of GM Cadillac pilot: misaligned incentives
  – Decentralized system with cooperation and search—relative performance depends on search cost
• Class 7: Revenue Management
  – Transportation nat’l Group case – application of RM to storage rental
  – Use of optimization to assess potential and provide guidelines for setting prices
  – Challenges of introducing RM in this context

• Class 8: Pricing Strategies
  – Principles of RM
  – Use of coupons (mail-in rebates) by manufacturer to achieve global optimization of SC
  – Smart pricing in supply chains
• Class 9: Supply Chain Design: Configuration
  – Optimization model and framework for supply chain configuration – selection of options at each stage of network
  – Illustration of trade off between cost and time

• Guest Speaker: Mike Romeri, PRTM
  – Supply chain implementation challenges
  – Creation of supply chain solutions
• Class 11: Procurement strategies
  – Supply contract game
  – Insights into bidding strategies
  – Need to be on efficient frontier
  – Need only compete against neighbors
• Class 10: Capacity Planning: Seagate
  – Example of capacity planning under uncertainty
  – Value of flexible capacity as an hedge
• Class 12: Flexibility and Capacity Planning
  – Framework for thinking about flexibility and its benefits
  – Principles for deploying flexibility
  – Limited flexibility can achieve benefits of total flexibility
  – Key is to chain as many plants and products together as possible
  – Assign comparable loads to each plant