

The University of Pennsylvania
The Wharton School
Operations and Information Management Department

Spring 2010

OPIM 632: Operations Management II: Supply Chain Management

I. Faculty Contact Information and Office Hours*

Cohorts	Instructor
A, B, C	Professor: Serguei Netessine Office: JMHH 549 Phone: 215-573-3571 E-mail: netessine@wharton.upenn.edu Office hours: Monday 3:00-4:30 PM
D, E, F	Professor: Senthil Veeraraghavan Office: JMHH 550 Phone: 215-898-0792 E-mail: senthilv@wharton.upenn.edu Office hours: Monday 3:00-4:30 PM.
G, H, I	Professor: Morris Cohen Office: JMHH 546 Phone: 215-898-6431 E-mail: cohen@wharton.upenn.edu Office hour: Monday 3:30-4:30 PM.
J, K, L	Professor: Narendra Agrawal Office: JMHH 555 Phone: 215-898-2829 E-mail: @wharton.upenn.edu Office hours: Monday 3:00-4:30 PM
TA Office Hours	To be announced during first week of course Location: JMHH 607 Phone: 215-573-7771
Final Exam	Monday, May 7, 6-8 pm. Location TBA.
Webcafe	https://webcafe.wharton.upenn.edu/eRoom/opim/632-sp10-1

* Additional office hours available by appointment.

II. Course Description

Matching supply with demand is an important challenge for firms: excess supply can lead to costly inventory write offs, while inadequate supply irritates customers and results in lost revenue. In this course we will explore how firms can organize their operations so that they more effectively align their supply with the demand for their products and services. Our aim is to provide both tactical knowledge and high-level insights needed by general managers and management consultants. We will describe how companies have used the principles from this course to significantly enhance their competitiveness.

Our emphasis is on managing uncertain demand, both within the firm and across the supply chain. We demonstrate that matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. In this course we will learn (1) how to assess the appropriate level of supply flexibility for a given industry and (2) explore strategies for economically increasing a firm's supply flexibility. When supply is not flexible, we will learn how to manage demand to better match it to our fixed supply.

III. Course Policy

This syllabus provides details on course policy and the schedule for OPIM 632. Students should read this material carefully at the start of the course.

IV. Grading

Each student's final numerical score for each course is based on the following items and weights:

- homework assignments (15%),
- class participation (25%),
- final exam (60%)

A student's grade is based on the ranking of the student's final numerical score for that course among the student's cluster (i.e., the three cohorts taught by the same professor). The faculty award grades approximately based on the following distribution: 15% A and A+, 20% A-, 30% B+, 20% B, 10% B-, 5% C+ or lower. A failing grade is awarded when performance is particularly poor (for example, fewer than 40% of final exam questions answered correctly).

Homework assignments:

- There are three homework assignments which constitute 15% of your final grade.
- Assignments are due by 4:00 p.m. on the assignment's due date. We prefer that you turn in assignments during your assigned class session, but if this is not possible, then an assignment should be returned to your professor's mailbox in the OPIM suite (500 JMHH).
- We will make every attempt to grade and return your homeworks within a few days of submission.
- Electronic submissions are not accepted. Each student must turn in his or her own assignment. We encourage students to attempt to complete the assignments on their own. However, to promote learning, students are allowed to discuss each assignment with any other student taking OPIM 632 during the current quarter.
- The assignments contain both quantitative and qualitative multiple-choice questions. Partial credit is not given. Credit is also not given on quantitative questions unless all work is shown.

Class participation:

- Please only attend the class session for which you are registered (section change requests have to be cleared with the MBA office) and adhere to the seat map.
- Please use your name card in each class.
- Please inform your instructor in advance if you have to miss a class, will be late, or will leave early.
- If you have not been able to prepare a case, or if you are uncomfortable with being called on in a particular class, please let your instructor know in advance of the class.
- Class participation is scored by each faculty member based on the degree to which your comments contribute to learning in case discussions and lectures.
- Frequent late arrivals as well as repeatedly missing a class will also be factored into the class participation score.

Final exam:

- The course has a multiple-choice final exam based on the contents of the course: analytical tools, case discussions, lectures, etc.
- The final exam will be an open book and open notes exam.
- The administration is very strict about ensuring all students take the exam on the assigned date. Please mark your calendars now!

V. Course Text, Readings and Handouts

The following *required* course material is available for purchase at the Penn Bookstore on the corner of 36th and Walnut Streets. This is the same book you used in OPIM631.

- Cachon, G. P. & Terwiesch, C. 2009. Matching supply with demand: An introduction to operations management. 2nd edition, McGraw Hill, Boston MA.

Cases are made available through <http://www.study.net>. In addition, exercises, copies of key overheads, readings and other notes of interest will be distributed in class during the course (and available for download on the course website).

OPIM 632 – Spring 2010 - Class Sessions

Session #	Date	Topic and Readings	Assignment Due
1	Wed, 3/17	Introduction Text: Chapter 11, sections 0-4 Text: Statistics Tutorial, Appendix A	
2	Mon, 3/22	The Newsvendor Model Text: Chapter 11, sections 5-8 Case: Le Club Français du Vin	
3	Wed, 3/24	Mass customization, outsourcing and make-to-order Case: Timbuk2 Text: Chapter 12, sections 0-4 (up to Limited Capacity)	
4	Mon 3/29	The Order Up-to Model Text: Chapter 13	#1
5	Wed, 3/31	Supply lead times and postponement Case: Hewlett Packard	
6	Mon, 4/5	Managing risk in operations Text: Chapter 14	
7	Wed, 4/7	Internet distribution Case: Online Book Retailing: Operational Strategies	
8	Mon, 4/12	Yield management Text: Chapter 15	#2
9	Wed, 4/14	Behavior in supply chains: Computerized Root Beer Game Pre-reading: Beer game rules	
10	Mon, 4/19	Contracting and Coordination in Supply Chains Discussion material: Will be posted on webcafe. Text: Chapter 16	
11	Wed, 4/21	Supply chain innovation Case: Zara Discussion material: Will be posted on webcafe.	
12	Mon, 4/26	Summary and review	#3
	Wed, 5/7	Final Exam, 6pm-8pm (Location TBA)	

OPIM 632: Session Descriptions

Session 632.1 Introduction

Wed; March 17

This session will cover the course syllabus and introduce the newsvendor model.

Reading: Text, Chapter 11: sections 0–4.

Text: Appendix A

Preparation:

- Read Chapter 11 (sections 0 to 4) carefully.
- Important: Appendix A contains a tutorial on the statistics needed for this course. You should at least skim through these pages to determine if you are comfortable with this material, and if not, you should read through this tutorial carefully.

Session 632.2 The Newsvendor Model

Mon; March 22

This session explores the challenges of procurement for a wine catalog retailer.

Case: Forecasting and Procurement at Le Club Français du Vin (Wharton case)

Reading: Text, Chapter 11: sections 5-8.

Case preparation:

- Consider a 10 Euro (retail price) bottle. What are the costs of having one bottle too few in inventory (underage cost)? What are the costs of having one bottle too many in inventory (overage cost)? List these costs qualitatively and attempt to attach numbers to them.
- Assume the underage cost is 3 Euro and the overage cost is 1 Euro. How many bottles would you order of a wine that is forecasted to sell 2000 bottles if your objective is to maximize profits? How do these numbers change if you use the cost numbers from your answer to Question 1?
- On the OPIM 632 Web Café there is an Excel file that contains data from Exhibit 2 in the case. How much of each wine listed in Exhibit 2 would you order? Be prepared to explain and justify your decisions.

Session 632.3 Mass customization, outsourcing and make-to-order

Wed; March 24

Mass customization offers an infinite variety of goods that are customized to a consumer's exact specifications. This session explores the pros and cons of this strategy and also discusses issues involved in outsourcing of manufacturing operations to low-cost countries.

Reading: Text, Chapter 12: sections 0-3.

Case: Where in the World is Timbuk2? Outsourcing, Offshoring, and Mass Customization (Wharton Case).

Case Preparation Questions:

- What channels does Timbuk2 sell through and which one is the most profitable?

- How should Timbuk2 go about deciding which mass-customization options to offer customers? Brennan talks about a very vague process based on management intuition. For instance, discuss the analysis for a decision by Timbuk2 on whether to allow customers to choose a different buckle? Timbuk2 currently offers a choice of colors for the three panels -- how do you think costs would change if customers also were allowed to choose the dimensions of the panels?
- What are the costs and benefits of moving production to China? Should Timbuk2 produce in more than one location (e.g., San Francisco and China at the same time)? If so, what are the issues? In particular, think about utilization of San Francisco factory before and after outsourcing as well as about inventory needs.

Session 632.4 The Order Up-To Model

Wed; March 29

This session studies service levels and lead times in a supply chain. Unlike with the newsvendor model, we now consider a supply chain that has demand over a long time horizon, so multiple replenishments are possible.

Assignment: Assignment #1 is due at the beginning of class.

Reading: Text, Chapter 13

Preparation:

- Read chapter 13 carefully. The session will be primarily a lecture on the mechanics of the model and the qualitative implications of the model.

Session 632.5 Supply lead times and postponement

Mon; Mar 31

Postponement is a strategy to redesign a product and its supply chain to increase supply flexibility.

Case: Hewlett-Packard: DeskJet Printer Supply Chain A and B (Stanford case)

Case preparation:

- What are the pros and cons of the following proposals mentioned in the A case: a European factory, better forecasting, more inventory.
- Assess quantitatively the air freight option relative to current operations. Just consider the products for the European market. Do not forget to consider pipeline inventory (since HP owns the pipeline inventory from Vancouver to Europe). Use the following assumptions:
 - HP wants to minimize inventory while still achieving at least a 98% in-stock probability.
 - The lead time from Vancouver to Europe is 5 weeks by the current method (ocean) but 1 week by air.
 - HP orders and received inventory on a weekly basis.
 - There are 4.33 weeks per month and demand is independent across time.
 - The product sells for \$450 and marginal production cost is \$300.
 - Inventory carrying costs are 24% per year.

- Shipping via sea (the current operation) costs \$10 per printer, whereas airfreight costs \$25 per printer.
- Evaluate quantitatively the proposal in the B case for the European market.
- Will the B case proposal be effective in the other major markets, North America and Asia?
- Would you support the B case proposal? If so, why? If not, why?

Session 632.6 Managing Risk in Operations

Mon; April 5

This session explores several operations strategies for reducing and hedging uncertainty.

Reading: Text, Chapter 14

Preparation:

- Read the text chapter.

Session 632.7 Internet Distribution

Wed; April 7

Internet retailing requires less inventory and retail space than brick-and-mortar retailing. But Internet retailing introduces additional costs. We shall compare these two models from an operations perspective.

Case: Online Book Retailing: Operational Strategies (Wharton Case).

Case Preparation Questions:

- What operational advantages and disadvantages does Amazon have relative to B&N's superstores?
- Compare costs at B&N with Amazon using data in the case (Excel file is provided on web café). Does Amazon's operational advantage outweigh its operational disadvantage? Discuss the source of cost advantage/disadvantage for every item of financial data in Exhibit 2.
- Consider the same analysis for B&N.com versus Amazon.com. Did B&N.com benefit from its parent brick-and-mortar company and why?
- What do you think of Amazon's prospects going forward?

Session 632.8 Yield Management

Wed; April 12

This session studies several yield management tools to increase revenue in the presence of fixed capacity and variable demand.

Assignments: Assignment #2 is due at the beginning of class.

Reading: Text, Chapter 15

Preparation:

- Read the text chapter.

Session 632.9 Behavior in supply chains: Computerized Root Beer Game Mon; April 14

This session introduces and focuses on the concept coordination between different firms within a supply chain.

Reading: Please login into the Root Beer Game and read information on the “Prepare” tab to familiarize yourself with the game and to make sure that your laptop is compatible. Be sure to watch the “how to play” movie.

Session 632.10 Contracting and Coordination in Supply Chains Wed; April 19

This session continues our discussion on supply chain coordination, with wrap-up of the Beer Game and then with discussion of contractual agreements existing between different firms.

Reading: Text, Chapter 16.

Reading material and discussion questions posted on course web site.

Session 632.11 Supply Chain Innovation Mon; April 21

In this session we will discuss how a company can revolutionize an otherwise mature industry not by changing products but by changing its supply chain structure.

Case: Marks & Spencer and Zara: Process Competition in the textile apparel industry (INSEAD case)

Case preparation:

- Compare Zara and Marks & Spencer: how do they differ in product offering?
- How do two companies differ in design, sourcing, distribution and retailing?
- Which of the two companies faces higher demand uncertainty, cost of underage and cost of overage? Are their choices of inventory levels consistent with these parameters?
- What do you think about issues that Zara is likely to face if it continues with the global expansion?

Session 632.12 Summary and Review Mon; April 26

This session concludes and reviews the course material.

Assignments: Assignment #3 is due at the beginning of class.

Preparation:

- No preparation is required for this session.