

Introduction to Technology and Operations Management (TOM)
IRGN 438 - Winter 2012
Professor Roger Bohn
Syllabus revision 1.0

Administrative information

Class meets Tuesday and Thursday 9:30 to 10:50, in the Gardner Room.

Faculty: Roger Bohn, Room RBC 1411, 534-7630. Office hours Tuesdays 11 to 12, Thursday 12:30 to 1:30, or by appointment. A TA will be posted later.

Use Turnitin.com for written assignments. Class ID 4694650 Enrollment Password: Bohn438. If you have not already done so, create your own user ID and password on the site. Instructions at <http://acms.ucsd.edu/units/iwdc/students.shtml>.

Use *First Class* for other communication. You are encouraged to discuss cases, relevant current events, etc. on the course conference. Pepper Lane in room 1328 can serve as a contact point for picking up and dropping off special material. ((858) 534-1019, PELane@ucsd.edu)

The textbook is a custom e-book, in PDF form from McGraw Hill. The readings are primarily from *Operations and Supply Chain Management*, 13/e by F. Robert Jacobs and Richard B. Chase. It also includes almost all of our case studies. A few readings will be provided via the UCSD library databases. You can purchase the book online from <http://create.mcgraw-hill.com/shop/> Specify ISBN 9781121429802. Pay by credit card.

Introduction

This course introduces the field of operations and technology management. Marketing is about “selling things,” operations is about “producing things.” Operations encompasses services, distribution, and *any* other repetitive activity in an organization. The range of industries and situations studied by TOM is vast – basically all human work. This year we have case studies on a casino, hospitals, aviation, retailing, electronics, and autos, among others. The course is designed for students in the for-profit and nonprofit management tracks.

TOM is where companies’ activities are translated into something that can be sold to feed, clothe, or entertain the world. Economists used to point to accumulation of capital goods (machinery) as the source of economic growth, but it’s now accepted that since about 1800 long-term growth is largely driven by technological progress. This progress allows making more, using less (physical) input – the heart of TOM. Inferior operating methods waste resources, energy, and workers’ time – and money.

The course uses case studies to develop your problem-solving skills. Cases are decision- and “first-person” oriented. Most of them require you to *identify*, *diagnose* and *solve* a problem in the organization. You must choose a course of action as a protagonist in the case, not analyze how someone else did or should make a decision. The course is divided into three modules:

- A. **Process Analysis:** How to dissect an operating system to figure out how it works and what drives its performance. What determines capacity? Cost? How can a company be more responsive to customer requests?
- B. **Supply Chains and Uncertainty:** Companies deal with thousands of product and service variations, and supply chains running across multiple companies and continents. Explicitly planning for variability and uncertainty are very important.
- C. **Quality and Improvement:** Customers expect defect-free products and services. The same tools that are used to improve quality are now also used to improve other performance, such as safety in hospitals. We will discuss the meaning of lean production, the Toyota production system, six sigma, and other buzz-words.
- D. **Choose your own topic:** Final projects give an opportunity to study whatever industry, business, or technology interests you.

Schedule

Page numbers are based on the green numbers in the text. Add 4 for the PDF page number.

Individual assignments, posted on First Class one week in advance, are the final reference for each day.

#	Date	Topic	Reading	Case study
1	10-Jan	Introduction	Text Section i, page 2-19	
Module A Process analysis: Meeting customer needs quickly and cheaply (5 cases, 1 lecture)				
2	12-Jan	Capacity and speed	Skim text Section 1 <i>Process Analysis</i> pp 20-51	Prepare Kristen's Cookie Company (A) pp 49-50
3	17-Jan	Bottlenecks	Text Section 1 <i>Process Analysis</i> pp 20-51	Shouldice Hospital Ltd pp 53-66
4	19-Jan	Choosing a technology	<i>Measuring and Managing Technological Knowledge</i> , via UCSD library.	Scharffen Berger Chocolate (A) pp 67-81.
5	24-Jan	Cost Analysis; Services	Text S. 4 pp 82-98 Operations/Finance link + S. 5 Services pp 100-121	Paper proposals due.
6	26-Jan	Front-room service	Review videos of Benihana	Benihana of Tokyo pp 123-139
+	29-Jan	Simulation	1 week exercise starts	Littlefield exercise
7	31-Jan	Is eco-farming viable? How does it work, how productive is it?		Polyface Farms pp 141-162
Module B – Supply Chains and Uncertainty (5 cases, 1 lecture, exam)				
8	2-Feb -	Quality methods	Text 8 Newsvendor model pp 164-199	Le Club Francais (not in textbook)
9	7-Feb	Buffering uncertainty	TBA	Barilla A and B pp 201-224 First case write-up required by today.
10	9-Feb	Supply chains	TBA	Zara Clothes pp 225-244.
+	12-Feb	Simulation	1 week exercise starts	Littlefield exercise 2 nd run
11	14-Feb	Analytic models	Analyzing Littlefield	Littlefield second run.

12	16-Feb	Global out sourcing	Text S. 11 Global Sourcing pp 246-267	Lego Group pp 269-280
13	21-Feb	Review	Discuss Littlefield results	Review all material. Updated paper proposals.
14	23-Feb	Midterm Exam		
Module C – Quality and Learning (4 sessions)				
15	28-Feb	Evolution of control	TBA	TBA
16	1-Mar	Quality analysis	Text S. 12, 12.1	Hank Kolb pp 300-301
17	6-Mar	Toyota Production System	Text S 13 p 328- 345	Toyota Motors pp 347-368
18	8-Mar	Quality cultures and supply chains		Jieliang Phone Home! (A) and (B)
19	13-Mar	TBA	TBA	See specific assignment
20	15-Mar	Projects	Student project presentations	
Exam	TBA	Final paper due	Final Exam	

Specific assignment questions and supplemental material will be provided weekly via First Class. Assignments for the first classes are at the end of this syllabus.

Course responsibilities and grading

Class participation and quizzes: 15% of grade directly; more indirectly. On-line discussion also counts as class participation. Computers should not be used in class until the last few minutes, so you will need to physically print out the cases and bring them to class.

Case write-ups: 20% Analyze two cases in writing. Teams of no more than two are permitted and encouraged. Write-ups should be in the form of a memorandum to someone in the case, explaining what you will do, and why. More advice on write-ups appears later in the syllabus. **Due dates:** The first write-up is due by Feb 7.

Littlefield Simulation: 15% This simulation of a production process runs for one week of real time. Teams of 4 will be assigned randomly. The first run of the simulation is 5% of the final grade; the second run is 10%.

Midterm exam: 15% The exam will be based on assigned case studies and readings.

Final paper and final exam: 35% You may either do a major paper, looking at an organization in the field, or a minor paper using primarily library research and following an assigned topic area. *If you do a major paper, there is no final exam.* Proposals for final papers should be submitted by Jan 24. Teams should be 2 to 4 in most cases. You will have to decide whether you are doing a major paper, or minor paper + exam, before the midterm.

Getting outside help: For case studies, you can talk to anyone in the class, but the final writeup, *including exhibits and spreadsheets*, should just be by you and a teammate. *Provide a list at the end of anyone you consulted with about the case.* This provides you

with a “safe harbor.” All the case facts you need are in the case itself (plus general knowledge); don’t go off and research the company. Textbooks and research papers discussing the principles at work are fair game.

For the final projects, *talk to anyone about anything*. Be sure to footnote your sources.

Maintaining Academic Integrity: Students agree that by taking this course and using Turnitin.com all submitted papers will be subject to textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

Turning in material

Follow a standard procedure when you turn case writeups and similar material:

- File format: You can use PDF (preferred) or Word. Exhibits/attachments should be included in a single file, including spreadsheet printouts.
- Case writeups and other graded assignments: Use Turnitin.com as the gateway.. Using the system is straightforward; instructions are on <http://acms.ucsd.edu/units/iwdc/turnitin.shtml> I will return most papers the same way, although some I will print out and hand-mark.
- Include your name(s) in the text of all documents, but *put them at the end of the last page*. Also include your email addresses. This allows me to grade anonymously. Remember to use memo format for case write-ups, so use fictitious “from” names.
- File name: Turnitin.com manages files, but if you send one by another method, include your name and the date in the file name. Use of Turnitin.com is not required, but it’s recommended for all routine assignments.
- For things like paper proposals, submit the file as an email message to me, *with a cc to all authors* so I can use “Reply All” to send comments.

Final Papers

Major paper: Investigate an actual organization and find a way to help (or at least analyze) their TOM situation. Teams can be up to 5 people for a big project; larger teams should go deeper into the subject. Target paper length 25 pages+ appendices for a team of 4.

Minor paper on choice of technology: Analyze some proposed new technology from a skeptical operations view. What will it have to achieve in order to be competitive with existing technology? Examples: algae to fuel, recycling proposal, inexpensive house, new farming method. Use primarily documents, although a few interviews can also be useful.

Minor paper on current events: Choose some recent event, such as a well-publicized disaster or mistake by a company. Analyze what went wrong operationally, what should have been done differently, implications for the industry or the company. What were the causes; are the underlying problems systemic, or was it just “bad luck?” The easiest topics will be ones with lots of coverage including government reports, such as disasters, airplane crashes, or product recalls.

Preparing Cases

In case studies, as in real life, you never have all the information you might want. And almost always, there is uncertainty: if you pursue a particular course of action, you can't be sure what will happen. Cases also present information that is ambiguous, and sometimes even contradictory or erroneous. Mr. Jones may say that everything worked well when he was in charge, but others may view the situation differently. Does other evidence in the case agree with his statement? If not, how can you reconcile the differences?

Theory provides us with some expectations, but is necessarily stylized and ignores real-world complexities. You must learn how to make reasonable decisions in the face of incomplete information, uncertainty, ambiguity and even deception. Be explicit about your underlying assumptions, so that you can defend them, or change them.

Every case study is different, but here are general guidelines for how to analyze them. Most good case analyses follow a sequence of steps. Although they are listed in logical order, you will usually jump back and forth among them when you are preparing.

1. Understand the situation and the setting

Read the case through once, including a quick look at the exhibits. (30 minutes)

What is the problem to be solved? What decisions need to be made? What critical problems is the organization having? Sometimes this is obvious, but often it requires subtlety to figure out the underlying forces behind the visible situations. (10 minutes)

Analyze the organization's environment. What business are they in; what do they have to do well to succeed? (Key success factors: KSF) What are alternative solutions? Some alternatives are usually spelled out in the case, but creativity may help to modify them and uncover others. (5 minutes)

2. Analyze the operating system.

If the problem is capacity, analyze bottlenecks and anything else that affects capacity. If there is a quality problem, do some root cause analysis. This is detective work, and will take roughly half of your preparation time. (30 minutes and up, depending on case complexity)

3. Analyze the alternatives, and select one or more

Show how actions will lead to consequences. Usually this is a matter of describing possible changes, then quantifying their effects and translating into dollars. Depending on the nature of the issues and information available, the analysis may be more or less quantitative, but it must always be rigorous. *Prepare some kind of comparison table* summarizing the effects, costs, and benefits of different courses of action – one of which may be the status quo. (30 minutes and up)

4. Implementation plan

Think through the next steps. You've said what should be done, but how do you actually make it happen? What obstacles and contingencies do you need to plan for? This sometimes reveals gaps in earlier steps. (15 minutes)

5. Discuss your ideas with a study group

Peer feedback on your ideas is very valuable. You are learning a very new set of skills, together. This will add confidence when you speak in class.

Case Write-ups

Translating from analysis into an effective write-up is an art in itself. Write-ups should be in the form of a memorandum explaining what you will do, and why. Assume that the reader is familiar with the case facts, and do not waste space on the obvious. Some suggestions:

- Write as a coherent document. Study questions suggest useful issues to investigate, but *are not intended as an outline for a memo*.
- Be clear about your final conclusion – what to DO. It is acceptable to include some tests as part of your implementation plan as long as you are specific about how to do them – “Try this approach for three months and see whether production rises by more than 15 percent.”
- Quantify, and usually end up with dollar estimates. Many times you will have to estimate numbers. For example, the case may not specify how much workers are paid, but you are proposing to add more workers. Use other information in the case, or your “general knowledge”, to make a reasonable guess about wages, and from that to calculate how much your proposal will cost. Usually your final solution won’t depend on the precision of your estimates.
- Use lots of diagrams and tables. Of course if you are crunching a tableau of numbers (e.g. daily numbers for a month) you will want to use a spreadsheet, but annotate it carefully to make clear what you are doing.
- When you calculate numbers, give a sense of their importance. “My plan will reduce cost by \$150,000 per year,” is a good start, but is this a large or small amount of money, in the context of the case?
- More generally, whenever you do a chunk of analysis explain what conclusions to draw from it. Be sure you have explained, “So what?” This is especially useful for exhibits –what does it show, why is that important? In a good case write-up it is often possible to understand your core analysis just by reading through the exhibits.

Assignments for Individual Classes

Class 2, 12 January, Process Analysis

Obtain textbook from McGraw Hill.

Read: Textbook sections i, pages 2 to 19. (All page numbers are based on green numbers in upper right of each page.) Quick read of Section 1, *Process Analysis*, pages 20 to 51

Prepare Case Study: Kristen's Cookie Company (A) on pages 49-50.

This is a very straightforward case, so you can thoroughly understand the process and its effects. Come to class with handwritten answers and be prepared to discuss them. You will not have to hand them in.

Optional nutritional supplement: Bake 2 dozen cookies, or visit Mrs. Field's Cookies and talk with the clerk about how they do it. Be prepared to report on your experiences.

1. How long will it take you to fill a rush order?
2. How many orders can you fill in a night, assuming you are open four hours each night?
3. How much of your own and your roommate's valuable time will it take to fill each order?
4. Because your baking trays can hold exactly one dozen cookies, you will produce and sell cookies by the dozen. Should you give any discount for people who order two dozen cookies, three dozen cookies, or more? If so, how much? Will it take you any longer to fill a two-dozen cookie order than a one-dozen cookie order?
5. How many electric mixers and baking trays will you need?
6. Are there any changes you can make in your production plans that will allow you to make more cookies in less time or at lower cost? For example, is there a bottleneck operation in your production process that you can expand cheaply? How much would you be willing to pay for an additional oven?

For further thought:

1. What happens if you are trying to do this by yourself without your roommate?
2. When should you promise delivery? How can you look quickly at your order board (list of pending orders) and tell a caller when his or her order will be ready? How much of a safety margin for timing should you allow?
3. Your product must be made to order because each order is potentially unique. If you decide to sell standard cookies instead, how should you change the production system? The order-taking process? Other policies?

Class 3 Shouldice Hospital Tuesday Jan. 17

Prepare: Shouldice Hospital Ltd. (Abridged) in textbook. Read carefully textbook Section 1, *Process Analysis*, pages 20 to 51.

Study questions:

1. As stated in the case, assume that (i) incoming patients arrive at the clinic the day before their operation, and stay at the hospital for three additional nights after their surgery to recover; (ii) new batches of patients can be admitted to the hospital every day of the week except Friday and Saturday. There are fixed number of patient rooms (89 beds). In steady-state, what is the *maximum* number of patients that Shouldice can admit each week? Explain any discrepancy with the historical patient admission rate of 7600 patients over 50 weeks.
2. Considering the historical average patient admission rate, what is the capacity utilization of the various resources at Shouldice? Resources include the examination rooms, admitting procedure, nurse stations, operating rooms, doctors, patient rooms.
3. Calculate the costs of operating Shouldice. Construct income statements for the hospital and the clinic. Why is Shouldice profitable, especially when it charges a price that is so much lower than competitors for the same operation?
4. What are the major differences between Shouldice and hernia operations at more traditional hospitals? Why does Shouldice have better process performance than most hospitals (eg faster recovery, lower recurrence)? What are the strengths and weaknesses of its approach?
5. What should they do about expansion? (Optional)

If you are going to formally write up this case, follow the instructions on how to submit electronically, and keep a hard copy for class. Otherwise, bring to class a hard copy of the case, with your conclusions on it.