TOPIC: Process Fundamentals I

OBJECTIVES & COMPETENCIES:

The first module introduces the concept of an operating system, which we define as a system of operating processes that take inputs (e.g. labor, capital, equipment and materials) and transform them into outputs of greater value to the organization’s customers. Inherent in the design and management of an operating system is a set of interrelated decisions that govern how work is organized. These decisions represent some fundamental trade-offs that drive manufacturing and service design and operations. Since not all operating systems can be all things to all constituencies, the module explores how different operating environments serve different requirements.

- Identify the purpose of an operating system.
- Identify the set of managerial choices that, together, make up an operating system.
- Understand how to analyze a process.
- Identify performance implications of different process design choices.
- Understand the relationship between process design and product lifecycle.

KEY CONTENT:

- Measures of process operating performance
- Little’s law
- Strategic process alignment

PREPARATION READING & ASSIGNMENTS:

CASES:

- Benihana of Tokyo. Harvard Business School Case
- Process Analysis. Harvard Business School Article, (web-based article, available only online through class coursepack)
- Kristen’s Cookie Company (A). Harvard Business School Case
- Dore-Dore. Harvard Business School Case

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ASSIGNMENT QUESTIONS:

Case: Benihana of Tokyo

This case describes the development of the Benihana restaurant "model." The company, started by a young Japanese entrepreneur, has grown to a chain of 15 restaurants. In class we will discuss Benihana's operational design choices, the typical process flow used by a Benihana restaurant, and the impact of the design and execution of Benihana's operations strategy on the company's performance. Questions:

1. What are the differences between Benihana's production process and that of a typical restaurant? How do these differences affect a customer's service experience?

2. Examine the design of Benihana's operating system in detail. What major design choices enable the meal to be served in less than one hour during the peak period?

3. Compare the operating statistics for a typical restaurant (see Exhibit 1) with those of Benihana for major categories such as food cost, beverage cost, payroll, and rent. Why does Benihana have a food cost of 30-35%, whereas the typical restaurant has a food cost of 38-48%?

Reading: Process Analysis

This is an overview note that introduces the fundamental terminology and concepts in the module. Don't feel that you must understand every term and every concept in depth right away; your understanding of the ideas and tools in the note should solidify and deepen during the following case discussions. Indeed, you will probably want to go back and reread the note at some later time.

Case: Kristen’s Cookie Co.

Please address the questions at the end of the case.

Case: Dore-Dore

Evaluate the changes Dore-Dore has made in its children's knitwear division. How does the performance of the traditional operation and the cellular manufacturing system differ? For example, how does work-in-process inventory change when cells are implemented?

1. What changes are required to ensure successful implementation of cellular manufacturing? Is worker cross-training necessary?

2. What is Dore-Dore's motivation for converting to cells? Should the company continue with its plans for complete implementation of cells in children's knitwear? If not, which knitwear products (if any) should be manufactured in cells?

3. Should Dore-Dore implement cells in its hosiery production area? If so, would you suggest any changes to the cell design as currently proposed by M. Enfert? If not, what alternative approaches could Dore-Dore take to address the concerns M. Marguet raises in the case?

Note: Dore-Dore workers worked 8 hours per day, 5 days per week.
TOPIC: Process Fundamentals II

OBJECTIVES & COMPETENCIES:

The first module introduces the concept of an operating system, which we define as a system of operating processes that take inputs (e.g. labor, capital, equipment and materials) and transform them into outputs of greater value to the organization’s customers. Inherent in the design and management of an operating system is a set of interrelated decisions that govern how work is organized. These decisions represent some fundamental trade-offs that drive manufacturing and service design and operations. Since not all operating systems can be all things to all constituencies, the module explores how different operating environment serve different requirements.

- Analyze a complex process and identify improvement paths.
- Analyze a continuous process and identify inventory as the integration of the differences between inflows and outflows
- Understand the relationship between process design and product lifecycle.
- Understand the role of inventory as a ‘hedge’ for process variability
- Understand the relationship between process design and product lifecycle.
- Understand the impact of process variability in operational performance

KEY CONTENT OF MODULE:

- Little’s law
- Product Process matrix
- Assessment of process variability
- Queuing theory

PREPARATION READING:

- Bayonne Packaging, Inc. Harvard Business School Brief Case
- National Cranberry Cooperative, 1996. Harvard Business School Case
- Managing Queues. Harvard Business School Reading, (web-based article, available only online through class coursepack)

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ASSIGNMENT QUESTIONS:

Case: Bayonne Packaging, Inc.
1. What is Bayonne’s industry, type of operation? What are its key competitive priorities? What are its main problems?
2. What is the current capacity utilization in the work centers (excluding Finishing)?
3. What is the capacity, in pieces per day, of the Die-cut work center, if it were running orders of 30,000 pieces in the following three cases: a) none of the orders can be ganged; b) pairs of orders can be ganged; c) all of the orders can be ganged. Assume there are 15 available work hours per day and that the average setup takes 2.5 hours.
4. Assume that 40 of the orders partial in October each broke into a production run in the Royal/Queen work center, resulting in two setups for these orders instead of one. What would the capacity have been in October without these additional setups? What was the capacity with these additional setups?
5. What size of orders would you route to the Royal/Queen work center, and what to the Staude work center?
6. What is the yield at each of the work centers Sheet, Print, Die-cut, and Royal/Queen? What is the cumulative yield for an order which the sheeter starts with 40,000 sheets?
7. How do you explain Bayonne’s performance problems?
8. What should John Milliken recommend to Dave Rand?

Case: National Cranberry Cooperative, 1996
National Cranberry Cooperative (NCC) is a grower-owned agricultural cooperative that processes and markets cranberries. The case relates the vice president of operations' concerns about NCC's receiving plant #1 (RP1). This plant receives harvested berries, which it cleans, grades, and sorts in preparation for packaging or further processing. RP1 is open for operation about four months a year. During the processing season in the year prior to the time of the case, the plant incurred high overtime costs. In addition, the coop's grower-owners' truck drivers were frequently forced to wait long hours to unload their crops. Several alternative solutions to these problems are mentioned in the case, and additional alternatives can be formulated and evaluated.

Questions:
1. What are the most critical problems facing National Cranberry that Mr. Schaeffer must address?
2. What is your analysis of the process fruit operation of receiving plant #1? For your initial numerical analysis, look at a day where 18,000 barrels of berries arrive, of which 70% are wet. Assume that trucks arrive evenly spaced throughout an 11-hour day starting at 7:00 a.m., and that processing operations (i.e. receiving, dechaffing, milling, etc.) also start at 7:00 a.m.
3. What recommendations, both short-term and long-term, would you make to Mr. Schaeffer?

Note: No data file is made available for this case. Although this case requires analysis, I believe that good, clear conceptual thinking is required to understand this case and that the analysis can be done best manually.

Reading: Managing Queues
Read the note. Don’t sweat too much trying to understand all the equations in the note – intuition for those equations will be developed in class. However, do come prepared to present and discuss your solution to the following problem.
TOPIC: Process Improvement I

OBJECTIVES & COMPETENCIES:

Because competitors, customers, technology, and regulations are always changing the context within which an operating process needs to perform, most operating processes have to continuously adapt to those new requirements. That is, the ‘alignment’ defined in the previous module is only temporal, and for a process to remain viable it has to figure out how to continuously improve. The goal of the second module is to understand the core requirements for a process to be improvable and how to manage that continuous improvement process while at the same time continue to deliver the products and services that the process is responsible for. The module will not only cover the different dimensions for process improvement (throughput, quality, cost, etc.) and the approaches available for that improvement, but will also focus on the social dimension of the required change and serve as a starting point for a module on change management.

• Identify the challenges of improving a process that in most cases is defined to be standard and stable.
• Identify the pre-requisites for process improvement.
• Assess the organizational capacity and capabilities for improvement.
• Understand the principles and the improvement philosophy behind Statistical Process Control.
• Understand the key elements of the Toyota Production System (Lean Manufacturing).

KEY CONTENT:

• Organizing for execution vs. organizing for improvement
• Statistical Process Control
• Lean Manufacturing {Just in Time, Kaizen}
• Improvement Capacity

PREPARATION READING & ASSIGNMENTS:

• Process Control at Polaroid (A). Harvard Business School Case (w/spreadsheet)
• Constructing and Using Process Control Charts. Harvard Business School Reading
• Managing Quality with Process Control. Harvard Business School Reading (web-based article, only available through class coursepack)
• Toyota Motor Manufacturing, U.S.A., Inc. Harvard Business School Case

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ASSIGNMENT QUESTIONS:

Case: Process Control at Polaroid (A)  
Constructing and Using Process Control Charts  
Process capability (http://www.npd-solutions.com/proccap.html)

In the mid-1980s, one of Polaroid's instant film plants is reassessing its traditional approach to quality and is trying to move itself onto a new improvement path. Management must decide what recently gathered data reveal about process control and what actions are appropriate. The reading provides an introduction to Statistical Process Control (SPC). (Note: polaroid.xls contains data in case exhibits 1, 3, 5 and 6.) Questions:

1. What is the magnitude of the cost of the quality problem at the R2 plant? How effective were its past procedures for quality management?

2. Using the data in the exhibits and the note on process control charts, construct and analyze the appropriate SPC charts. What conclusions should Rolfs draw?

3. What recommendations would you make to Rolfs in order to address both near- and longer-term issues?

Case: Toyota Motor Manufacturing, U.S.A., Inc.  
Factory Physics (§§4.1-4.2)

On 1 May 1992, Doug Friesen, manager of assembly at the Toyota's Georgetown, Kentucky plant, is concerned about problems with seat installation and wonders how best to resolve them and to which he should give highest priority. With sales approaching plant capacity, it is crucial that Friesen choose the most effective path in light of TPS and the realities of the plant organization. Questions:

4. What are the principal elements of the Toyota Production System? What capabilities must an organization possess in order to implement TPS effectively?

5. As Doug Friesen, what would you do to address the seat problem? What options exist? Where would you focus your attention and solution efforts? What would you recommend? Why?
TOPIC:  Process Improvement II

OBJECTIVES & COMPETENCIES:

Because competitors, customers, technology, and regulations are always changing the context within which an operating process needs to perform, most operating processes have to continuously adapt to those new requirements. That is, the ‘alignment’ defined in the previous module is only temporal, and for a process to remain viable it has to figure out how to continuously improve. The goal of the second module is to understand the core requirements for a process to be improvable and how to manage that continuous improvement process while at the same time continue to deliver the products and services that the process is responsible for. The module will not only cover the different dimensions for process improvement (throughput, quality, cost, etc.) and the approaches available for that improvement, but will also focus on the social dimension of the required change and serve as a starting point for a module on change management.

- Identify the role of an information system in the coordination of an operating system.
- Understand the benefits and challenges of Enterprise Resources Systems.
- Identify, in a variety of settings, social implementation constraints and courses of action to minimize them.
- Develop principles to establish objectives for change initiatives and improvement programs.
- Understand the pre-requisite for sustainable improvement programs.

KEY CONTENT:

- Materials Requirement Planning
- Change management
- Improvement half-life
- Management push vs. employee pull
- Improvement paradox

PREPARATION READING & ASSIGNMENTS:

- Digital Equipment Corporation: The EndPoint Model (A). Harvard Business School Case
- Case: AT&T’s Transmission Systems Business Unit (A). Harvard Business School Case

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ASSIGNMENT QUESTIONS:

Case: Digital Equipment Corporation: The EndPoint Model (A)
Factory Physics (§§3.1-3.1.4)

This case is a natural transition between the process improvement module and the supply chain management module. While the case still deals with the challenges of process improvement, the context of that improvement is the coordination of operations across organizational boundaries. Please read the introduction to Material Requirements Planning from the Factory Physics book, and then prepare the case. Questions:

1. What is your evaluation of the EndPoint model? In what ways does “virtual integration” differ from vertical integration or the location of manufacturing adjacent to suppliers?
2. What is your evaluation of the EndPoint plan? Why did DSM choose to begin by implementing MRPII?
3. What did DSM learn from its experience with MRPII?
4. What are your recommendations for the future?

Case: AT&T’s Transmission Systems Business Unit (A)

In June 1993, David Milner, the newly appointed director of the product development interval (PDI) reduction project for AT&T’s Transmission Systems Business Unit (TSBU), is formulating the program’s new strategy. Under his predecessor, the project had recently achieved its main objective by cutting the PDI by 50% in three years, thanks to the remarkable success of the Achieving Process EXcellence (APEX) teams—groups of functional experts focusing on improving the throughput time of individual tasks of the product development process. Now, amid an environment of high expectations fueled by TSBU’s receiving the Malcolm Baldrige National Quality Award, Milner is faced with the challenge of sustaining the PDI reduction initiative project. Questions:

1. What is product development interval? Why is it important for TSBU?
2. How are the APEX structure and processes different from the two previous initiatives launched to reduce the product development interval? Do those differences account for APEX success?
3. Why did APEX take off? How did the APEX teams achieve momentum? How do you explain the acceptance of the APEX project reviews?
4. What recommendation would you make to Mr. Milner about the new goals for APEX? Why?