Class 19: Course Wrap-up

1. Course Main Concepts and Simulation Debriefing

2. Sloan Evaluation Forms

3. Final Feedback Survey

after class

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## Intro to Ops At-a-Glance

<table>
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<tr>
<th>#</th>
<th>Day</th>
<th>Date</th>
<th>Contents</th>
<th>Readings</th>
<th>Assignments</th>
<th>Sim</th>
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<tr>
<td>1</td>
<td>Mon</td>
<td>29-Mar</td>
<td><strong>Course Introduction</strong></td>
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<td>Course Syllabus</td>
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<td>Wed</td>
<td>31-Mar</td>
<td><strong>Case: Burger King + McDonald's</strong></td>
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<td>Fri</td>
<td>2-Apr</td>
<td><strong>Lecture: Capacity</strong></td>
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<td>Wait-in-line blues</td>
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<td>Mon</td>
<td>5-Apr</td>
<td><strong>Case: National Cranberry</strong></td>
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<td>5</td>
<td>Wed</td>
<td>7-Apr</td>
<td><strong>Case: Webvan</strong></td>
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<td>9-Apr</td>
<td><strong>Lecture: Inventory</strong></td>
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<td><strong>Case: Barilla</strong></td>
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<td>14-Apr</td>
<td><strong>Case: Sport Obermeyer</strong></td>
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<td><strong>Lecture: Production Control</strong></td>
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<td><strong>Case: Hewlett-Packard</strong></td>
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<td>3-May</td>
<td><strong>Case: Global Financial Corporation</strong></td>
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<td>Fri</td>
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<td><strong>Lecture: Product Design</strong></td>
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<td>10-May</td>
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<td>19</td>
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<td>12-May</td>
<td><strong>Simulation &amp; Course Wrap-up</strong></td>
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*Readings and Assignments are placeholders for actual course materials.*

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What is Operations Management?

OM = Strategy Execution!

TIME

QUALITY → FLEXIBILITY

COST

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### Benchmark Companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Strategy</th>
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<tbody>
<tr>
<td>Toyota</td>
<td>Lean Manufacturing</td>
</tr>
<tr>
<td>FedEx (Webvan)</td>
<td>Hub &amp; Spoke</td>
</tr>
<tr>
<td>Dell</td>
<td>Direct-to-Consumer</td>
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<td></td>
<td>ATO technology</td>
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<td>Walmart (Barilla)</td>
<td>Vendor-Managed Inventory</td>
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<td>Sport Obermeyer</td>
<td>Quick Response</td>
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<td>Zara</td>
<td>Assortment Optimization</td>
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Operations Management History

- 1920’s: Ford & Taylor
  Moving Production line and standardized work
- 1930’s: Shewhart
  Statistical Control of Quality
- 1960’s: Ohno
  Lean Production System
- 1980’s: Goldratt
  Theory of Constraints
- 1990’s: Hammer
  Reengineering & Process Focus
- 2000’s: 15,760 Alumni
  Storytelling
A Translation Challenge

Corporate Structure

Top Management speaks the language of MONEY

Operations Management

Mid-Mgt., Associates, Workers speak the language of THINGS

OM merges physical and financial analyses, and requires great care to people issues!

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Operations Management Architecture

Product

Integral Vs. Modular:
- Functions
- Interface
- Interchangeability

Supply-Chain

Integral Vs. Modular:
- Geography
- Organization
- Culture
- Communication

Process

Integral Vs. Modular:

HR

Functional Managers

General Manager

Project Managers
Operations Management Activities

Set of responsibilities:

1. **DESIGN**  
   Product, Process, Supply-Chain, HR

2. **PLANNING**  
   Demand (forecast), Supply (Capacity)

3. **CONTROL**  
   Inventory, Production Control, Suppliers  
   Pricing, LT Quote, Quality, HR

4. **IMPROVEMENT**  
   Time, Cost, Flexibility, Quality
## Operations Management Tools

<table>
<thead>
<tr>
<th></th>
<th>Product Design &amp; Devlpt.</th>
<th>Process</th>
<th>Supply Chain</th>
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<tbody>
<tr>
<td><strong>Design</strong></td>
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<tr>
<td><strong>Planning</strong></td>
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<td><strong>Control</strong></td>
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<tr>
<td><strong>Improvement</strong></td>
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</table>
## Factory Simulation Skills

### Product Design & Devlpt.

- **Process**
  - Process Architecture
  - Process Flow Diagram

- **Supply Chain**
  - Inventory Control
  - Team Organization
  - TOC (The Goal)
  - TPS

### Design

- Planning
  - Forecasting
  - Capacity Analysis
  - Cycle Time Analysis

### Control

- Improvement

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Capacity Analysis

<table>
<thead>
<tr>
<th>Step</th>
<th>Station</th>
<th>Set-up time (per lot)</th>
<th>Operation time (per unit)</th>
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<tr>
<td>1</td>
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<td>0</td>
<td>0.062777</td>
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<td>0.021388</td>
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</table>

\[ \rho = \frac{\lambda}{N \times \mu} \]

FORECAST

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... and Queueing Theory

\[ W = \frac{1}{\lambda} \rho \frac{\sqrt{2(S+1)}}{1 - \rho} \times \frac{C_A^2 + C_S^2}{2} \]

\[ \rho = \frac{\lambda}{M \times \mu} \]
An Example for Insight

1 job arrives every minute on average

Queue initially empty

Server takes 45 sec. to process each job

λ = 1

μ = 1.33

Time (min)

Queue Length

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Cycle Time Analysis

60 kits/lot

Station 1
Station 2
Station 3
Station 2

30 kits/lot

total cycle time

total cycle time

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Customer and Process Timeline

Target customer delivery LT

PULL

PUSH
Delayed Differentiation

Delaying Differentiation

Upstream Steps

Customization Step

LT1

LT2

0

t

Target customer delivery LT

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Delayed Differentiation

Upstream Steps

Customization Step

Target customer delivery LT

0

LT1

LT2

t

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Inventory Theory...

Inventory

LT = Lead Time
EDDLT = Expected Demand During Lead Time

Order 1 placed
Order 1 received

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Slide courtesy of Prof. Thomas Roemer, MIT.
... and Inventory Practice

- EOQ Model
- ROP/ROQ
- Newsboy Model
- Continuous Review/Periodic Review
Simulation Performance Drivers

• Proactive Vs. Reactive Strategy: this is what models allow!!!
• Extent of quantitative analysis does have an impact BUT describing qualitatively the correct trade-offs brings you a long way…
• Understanding financial impact of operational data (lead time, utilization, queues, etc…) had a huge impact!
Final Words

Do Keep in Touch and…
GOOD LUCK!!!