

# PRODUCTION/OPERATIONS MANAGEMENT

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## Outline

- Production and Operations
- Systems Approach to P/OM
- Modeling Production Systems
- Course Topics



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## Production and Operations



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## P/OM

- Production management
  - Historically associated with manufacturing
- Operations management
  - Emphasis on services applications
- P/OM
  - The fields have merged
  - Common approaches to managing the creation of products & services



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## Objective of P/OM

- The efficient creation of quality goods and services
- Is accomplished by designing and optimizing production facilities and processes



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## Production Manager's Job

- Planning
  - Capacity
  - Location
  - Products and services
  - Make or buy
  - Layout
  - Projects
  - Scheduling
- Controlling
  - Inventory
  - Quality
- Organizing
  - Degree of centralization
  - Subcontracting
- Staffing
  - Hiring/laying off
  - Use of overtime
- Directing
  - Incentive plans
  - Issuance of work orders
  - Job assignments



## Systems Approach to P/OM



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## What is a System?



- A collection of related parts forming an integrated whole
- Examples:
  - Information system
  - Transportation system
  - Educational system
  - Marketing system
  - Production system

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## Elements of a System



- The parts or elements of a system should be designed to work together to achieve the overall system goal
  - Systems have objectives
  - Better systems achieve those objectives efficiently
  - The best systems optimize the elements and their interactions

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## Example: A Car



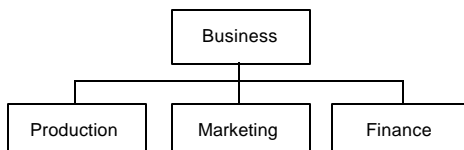
- A car is a transportation system with:
  - Power-transmission system: for movement
  - Braking system: to retard movement
  - Steering system: for guidance
- All subsystems work together to achieve the car's objectives



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## Businesses as Systems

A business is a system with a set of goals



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## Business Subsystems



- Component subsystems include:
  - Production system — to create goods and services
  - Marketing system — to sell goods and services produced
  - Financial system — to manage funding

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## Optimizing Systems

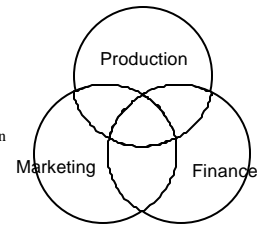
- Optimizing the individual components
  - Production system:
    - Create only one product/service
    - Specialize process for optimal production
  - Marketing system:
    - Sell many products and services
    - Satisfy all customer demands to maximize revenues generated

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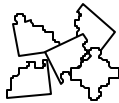
## Optimizing Systems

- For the best overall system solution
  - Make several products/services
  - Neither subsystem is optimized in isolation
  - The overall organization benefits
- Optimize globally, not locally



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## Elements of Organizational Systems



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## Six Elements of Systems

- Objectives
- Constraints
- Inputs
- Outputs
- Processing
- Control

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## 1. Objectives

- Goals of a business?
- Other tempering objectives:
- For measuring and evaluating a system
- May be undefined or unstated

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## 2. Constraints

- Limits on possible actions
- Some come from other entities in the operating environment, such as:

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## Example Constraints

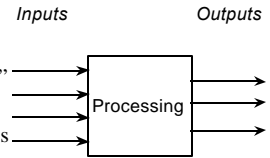
- Legal
- Financial
- Labor
- Technology

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## System as Transformer

- A system can be viewed as a transformer
- Processing “inputs” into “outputs”
- Inputs are resources used to create the performance/quality outputs

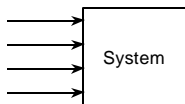


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## 3. Inputs

- Those resources used to create system outputs
- Business examples:

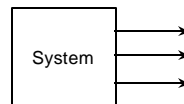


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## 4. Outputs

- That which is to be produced
- Usually contribute to achieving objectives
- Examples:

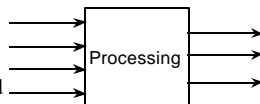


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## 5. Processing

- Manipulation of the inputs to achieve the outputs
- How work is accomplished
- How value is added



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## Food Manufacturing System

Inputs	Processing	Outputs
Raw Vegetables	Cleaning	Canned vegetables
Metal Sheets	Making cans	
Water	Cutting	
Energy	Cooking	
Labor	Packing	
Building	Labeling	
Equipment		

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## Hospital Service System

Inputs	Processing	Outputs
Doctors, nurses	Examination	Healthy patients
Hospital	Surgery	
Medical Supplies	Monitoring	
Equipment	Medication	
Laboratories	Therapy	

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## Types of Processing

- Three basic processing arrangements:
  - Project: one-time piece of work
    - Construction, political convention
  - Flow-shop: highly repetitive, continuous process
    - Auto & paper production, directory assistance
  - Job-shop: small batches of large variety
    - Machine shop, hospital, restaurant
- Each covered in detail later in course

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## 6. Monitoring and Control

- Control: the ability to regulate the operation of the system
- Purposes:
  - Insure accuracy by detecting errors
  - Prevent system misuse or destruction
  - Direct the system toward its objectives

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## Example System Controls

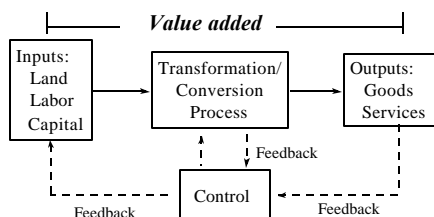
- Information and computer systems:
- Air transportation systems:
- Production systems:

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## Value Added

= the difference between the cost of inputs and the value or price of outputs.



## Modeling Production & Operations Systems



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## Models

- Simplified representations of reality
  - Useful model: accurate enough
- Many types of system models:
  - Physical: wind-tunnel
  - Schematic: blueprints, road maps
  - Mathematical: spreadsheets, simulation, optimization (variables, equations, program)

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## Production/Operations Models

- Systems Planning
  - Forecasting
  - Decision analysis
  - Linear programming
  - Network flow
  - Facility location
  - Facility layout
- Projects
  - CPM, Pert
  - Resource constraints
- Job Shop
  - Aggregate scheduling
  - Sequencing and scheduling

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## Production/Operations Models

- Flow-shop:
  - Line balancing
  - Queuing
  - Simulation
- Control
  - Quality control
  - Inventory control
  - MRP
  - Just-in-time
- Process Improvement
  - Total quality management
  - Cycle-time reduction

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