Chapter 2 Process Strategy and Analysis

TEACHING TIP
This chapter focuses on process strategy and analysis, which specifies the pattern of decisions made in managing processes so that the processes will achieve their competitive priorities assigned to it, such as quality, flexibility, time, and cost. Note that supply chains have processes also, they just have external suppliers and customers. The chapter then provides some tools and perspectives of process analysis

TEACHING TIP
Introduce with a business example, such as CVS Pharmacy. The opening illustrates that careful design and execution of processes can have a positive impact on customer satisfaction and ultimately on the business outcomes and financial success.

1. Emphasize that processes are everywhere, in all functional areas of the enterprise.
    a. As explained in Chapter 1: processes are found in accounting, finance, human resources, management information systems, marketing, supply chain, and operations.
    b. They are the basic unit of work.
2. Managers must see to it that processes in all departments are adding as much customer value as possible.
3. Two basic change strategies for analyzing and modifying processes: process reengineering and process improvement
4. Three particularly important principles concerning process strategy
    a. Successful process decisions require choices that fit the situation and make sense together (*strategic fit*).
    b. Individual processes are the building blocks that eventually create the firm's whole supply chain.
    c. Management must pay particular attention to the interfaces between processes whether they are performed internally or externally by outside suppliers or customers. These interfaces underscore the need for cross-functional coordination.
5. Four common process decisions
    a. Process structure
    b. Customer involvement
    c. Resource flexibility
    d. Capital intensity

1. Process Structure in Services

TEACHING TIP

One of the first decisions a manager makes in designing a well-functioning process is to choose a process type that best achieves the relative importance of quality, time, flexibility, and cost for that process.

1. Nature of Service Processes: Customer Contact
   a. A good process strategy for a service process:
      - Depends on the type and amount of customer contact.
      - Customer contact: the extent to which the customer is present, is actively involved, and receives personal attention during the service process.
   b. Dimensions of customer contact
      - Physical presence (face-to-face interaction is sometimes called a *moment of truth*, or *service encounter*)
      - What is processed
        ⇒ People-processing services
        ⇒ Possession-processing services
        ⇒ Information-based services
      - Contact intensity
        ⇒ Active contact: the customer is very much a part of the creation of the service, and affects the service process itself. Dental, psychiatric services for example.
        ⇒ Passive contact: the customer is not involved in tailoring the process to meet special needs, or in how the process is performed. Public transportation, theaters, for example.
      - Personal attention
        ⇒ When contact is more personal, the customer *"experiences"* the service rather than just receiving it.
      - Method of delivery used
        ⇒ Face-to-face or telephone versus regular mail or standardized e-mail message
2. Customer-contact matrix (fitting the service processes with customer contact)
   a. Customer contact and customization
      - A key competitive priority is how much customization is needed
      - Competitive priorities require more customization, the more the customer is present and actively involved.
   b. Process divergence and flow
      - Process divergence: extent to which the process is highly customized with considerable latitude as to how it is performed

⇒ High divergence involves much judgment and discretion. Consulting and law, for example

⇒ Low divergence is more repetitive and standardized

- Process flow, closely related to divergence, may range from highly diverse to linear.

⇒ Flexible flow means movements in diverse ways.

⇒ Line flow means movement in fixed sequence.

3. Service process structuring (three process structures forming a continuum)
   a. Front office: a process with higher customer contact where the service provider interacts directly with the customer
   b. Hybrid office: a process with moderate levels of customer contact and standard services with some options available
   c. Back office: a process with low customer contact where the service provider interacts little with the customer

TEACHING TIP
The Ritz-Carlton Hotel Company targets the top 1 to 3 percent of luxury traveler, and so gives a huge emphasis on customization and top quality. The associates at the front desk characterize a front office, because the customers are present, take an active part in creating the service, receive personal attention, and have face-to-face contact.

2. Process Structure in Manufacturing

TEACHING TIP
Emphasize that many processes in a manufacturing setting are actually services to internal (or external) customers, so the previous section applies also to manufacturing.

Manufacturing processes convert materials into goods that have a physical form.

1. Product-process matrix
   - Three elements
     - Volume
     - Product customization
     - Process characteristics
   - A good strategy for a manufacturing structure depends first on volume.
   - Customer contact is not normally a consideration for manufacturing processes, although it is a factor for the service processes in manufacturing organizations.
   - Vertical dimension deals with the same two characteristics in the customer-contact matrix: divergence and flow
2. Manufacturing process structuring

- Process choice: A way of structuring the process by organizing resources around the process or organizing them around the products
- Four process choices, forming a continuum
  - Job process, high variety of products
  - Batch process, higher volumes, batching of customer orders. Further differentiated as small batch and large batch processes.
  - Line process, high-volumes, standardized products, dedicated resources, repetitive manufacturing
  - Continuous flow process, the extreme end of high-volumes, rigid line flows. Primary material moves without stopping.

3. Production and inventory strategies

- Design-to-Order Strategy
  - Designing new products that do not currently exist
  - Manufacturing to meet unique customer specifications
- Make-to-order strategy
  - Make products to customer specifications in low volumes with job or small batch processes,
  - Matches up with flexibility (customization) and top quality
- Assemble-to-order strategy
  - Producing a wide variety of products from relatively few subassemblies and components after the customers orders are received
  - Allows delivery speed and high process divergence
  - Principle of *postponement*
- Make-to-stock strategy
  - Feasible for standardized products with high volumes and reasonably accurate forecasts with line or continuous flow processes
  - Holding items in stock for immediate delivery
  - Combined with line process, it is sometimes called **mass production**
  - Choice for delivery speed and low cost

4. Layout

A *layout* is the physical arrangement of operations (or departments) created from the various processes and puts them in tangible form
An *operation* is a group of human and capital resources performing all or part of one or more processes.
See Supplement K

3. Process Strategy Decisions

1. Customer Involvement

TEACHING TIP
McDonald's uses its self-ordering kiosks to get its customers involved in the ordering process and to customize their orders This process not only increases accuracy of the order, but also streamlines the process

   a. Possible advantages

      - Improved competitive capabilities
      - Can increase value to customer
      - Can improve quality for some services if the customer seeks to be more active and to receive more attention
      - Can mean better quality and speed up delivery, or at least reduce the perceived waiting time
      - Might help when customization and high variety are highly valued
      - Costs can be reduced
      - Customers can perform final assembly: bicycles, toys for example
      - Can also help coordinate across the supply chain.

   b. Emerging technologies: in a market where customers are technology-enabled, companies can now engage in an active dialogue with customers and make them partners in creating value.

   c. Possible disadvantages

      - Can be disruptive, making the process less efficient
      - Can make the process too divergent
      - Quality measurement becomes more difficult
      - Requires more interpersonal skills
      - Layouts may have to be revised
      - Can require many smaller decentralized facilities closer to the customer or a mobile service capability

2. Resource Flexibility

   a. Workforce

      - Implications of a flexible workforce

        ⇒ Requires more education and training

        ⇒ Alleviates capacity bottlenecks, volume flexibility

        ⇒ Often increased job satisfaction

      - Volume flexibility and needed skills determine the type of workforce.

⇒ Steady volume, high skills—permanent workforce

⇒ Variable volume, low skills—part-time or temporary employees to supplement permanent workforce

⇒ Variable volume, high skills—trained flexible force that can be moved to produce whatever the market demands

b. Equipment

- Managers must account for process divergence and diverse process flows when making resource flexibility decisions. Break-even analysis can be useful.
- **Application 2.1 Break-Even Analysis in Process Choice**.

BBC is deciding whether to weld bicycle frames manually or to purchase a welding robot. If welded manually, investment costs for equipment are only $10,000. The per-unit cost of manually welding a bicycle frame is $50.00 per frame. On the other hand, a robot capable of performing the same work costs $400,000. Robot operating costs including support labor are $20.00 per frame. At what volume would BBC be indifferent to these alternative methods?

	If welded manually (Make)	**If welded by robot (Buy)**
Fixed costs	$10,000	$400,000
Variable costs	$50	$20

$$Q = \frac{F_m - F_b}{c_b - c_m} = \frac{(10{,}000 - 300{,}000)}{(20 - 50)} = 13{,}000 \quad frames$$

- **Tutor 2.2** in MyLab Operations Management demonstrates how to do a break-even analysis for equipment selection.

3. Capital Intensity

a. Capital intensity is the mix of equipment and human skills in the process; the greater the relative cost of equipment, the greater is the capital intensity.

b. Automating manufacturing processes

- Advantage

⇒ Classic way of improving productivity when volume is high

- Disadvantages

⇒ Automated (capital intensive) operations must have high utilization.

⇒ Automation may not fit with competitive priorities being emphasized.

⇒ More capital intensity is not always best.

TEACHING TIP
Give business example, such as Gillette's package customization.

- Fixed automation: a manufacturing process that produces one type of part or product in a fixed sequence of simple operations

  ⇒ High demand volume

  ⇒ Stable product design

  ⇒ Long life cycle

TEACHING TIP
Mention chemicals and oil.

- Flexible (or programmable) automation: a manufacturing process that can be changed easily to handle various products.

  ⇒ Useful in both low-customization and high-customization

  ⇒ Can be quickly set up to make a variety of products in small batches

  ⇒ Perhaps show photos of the JustBorn robots

c. Automating service processes

- Using capital inputs as a labor-saving device is also possible for service processes. Examples:

  ⇒ Long-distance learning technology

  ⇒ ATMs

  ⇒ Financial services

  ⇒ Need volume to justify expensive automation, just as in manufacturing

  ⇒ May be front or back office

d. Economies of Scope

Requires a family of products having enough collective volume to utilize equipment fully

4. Strategic Fit

The manager process strategist should understand how the four major process decisions tie together.

1. Decision patterns for service processes
    a. Process structure
    b. Customer involvement
    c. Resource flexibility
    d. Capital intensity
2. Decision patterns for manufacturing processes
    a. Process structure
    b. Customer involvement
    c. Resource flexibility
    d. Capital intensity
3. Gaining focus
    a. Focus by process segments
        - Plants within plants (PWPs)
    b. Focused service operations
    c. Focused factories

5. Strategies for Change

1. Process reengineering

TEACHING TIP
Mention Bell Atlantic reengineered its telephone business. After 5 years, it cut the time to connect new customers from 16-days to just hours.

    a. Critical processes
        - Emphasis is placed on core business processes.
        - Processes are broadly defined in terms of costs and customer value.
    b. Strong leadership
        - Senior executives must provide a strong leadership for reengineering success
    c. Cross-functional teams
        - Reengineering works best at high-involvement workplaces.
    d. Information technology
        - Primary enabler of process engineering.

e. Clean-slate philosophy

- Start with the way a customer wants to deal with the company.

f. Process analysis.

- Understanding current processes can reveal areas where new thinking will provide the biggest payoff

2. Process Improvement

a. The systematic study of the activities and flows of each process to improve it.

b. The purpose is to understand the process.

3. Process Analysis

a. The documentation and detailed understanding of how work is performed and how it can be redesigned

b. Six Sigma Process Improvement Model: employees must be trained in the "whys" and the "how-tos" of process performance and what it means to customers, both internal and external

- Define: the scope and boundaries of the process to be analyzed are first established.
- Measure: once the metrics are identified, it is time to collect information on how the process is currently performing on each one.
- Analyze: use the data on measures to perform process analysis to determine where improvements are necessary.
- Improve: design team generates a long list of ideas for improvements. These ideas are then sifted and analyzed.
- Control: monitor the process to make sure that high performance levels are maintained.

6. Defining, Measuring and Analyzing the Process

TEACHING TIP
Introduce this section with business examples. It could be how processes were improved at McDonald's Corporation, which increased customer value with better processes, informed by innovative data collection.

1. Techniques give management insight on current processes and possible changes.

a. flowcharts

b. work measurement techniques

c. process charts

2. Flowcharts

a. Diagrams that trace the flow of information, customers, equipment, or materials through the various steps of a process.

b. Flowcharts show how organizations produce their outputs through a myriad of cross functional work processes, allowing the design team to see all the critical interfaces between functions and departments.

c. Swim Lane Flowcharts

- A diagram that groups functional areas responsible for different sub-processes into lanes.
- It is most appropriate when business processes span several departmental boundaries.

d. Service blueprints

- A special flowchart of a service process that shows which of its steps has high customer contact.
- Special feature: line of visibility that identifies which steps are visible to the customer.

TEACHING TIP
A more comprehensive treatment of work measurement techniques is provided in MyLab Operations Management *Supplement H, "Measuring Output Rates"* *Supplement I, "Learning Curve Analysis"*

3. Work Measurement techniques

a. Time study method

- Selecting the work elements within the process to be studied
- Timing the elements
- Determining the sampling size
- Setting the final standard

b. Elemental standard data approach

- Database of standards compiled internally for basic elements
- Works well when work elements within a certain jobs are similar to those in other jobs
- Sometimes the time required for a work element depends on variable characteristics of the jobs

c. Predetermined data approach

- Published database that divides each work element even more, into micromotions

d. Work sampling method

- Estimates proportion of time spent on different activities
- *Supplement H, "Measuring Output Rates" in MyLab Operations Management*

e. Learning curve analysis

- Takes into account learning that takes place on ongoing basis
- Learning curve and concept of doubling

- *Supplement I, "Learning Curve Analysis" in MyLab Operations Management*

4. Process Charts
   a. Concentrates in more detail on a smaller number of steps than does a flowchart.
   b. It is an organized way of documenting all of the activities performed by a person or a group of people at a workstation, with a customer, or working with certain materials.
   c. Five possible categories
      - Operation
      - Transportation
      - Inspection
      - Delay
      - Storage
   d. Estimate the annual cost of the entire process.
      - It becomes a benchmark against which other methods for performing the process can be evaluated.
      - Annual labor cost can be estimated by finding the product of
        ⇒ (1) time in hours to perform the process each time
        ⇒ (2) variable costs per hour
        ⇒ (3) number of times the process is performed each year

TEACHING TIP
Mention Video Case: "Process Analysis at Starwood." If possible, show the video that accompanies it, using the questions at the end of the written case and the "pause point" in the video itself to encourage class discussion.

5. Data analysis tools
   a. Checklists: a form used to record the frequency of occurrence of certain process failures.
   b. Histograms and bar charts
      - Histogram: summarizes data measured on a continuous scale, showing the frequency distribution of some process failures.
      - Bar chart: a series of bars representing the frequency of occurrence of data characteristics measured on a yes-and-no basis
      - Use **Figure 2.11**
   c. Pareto Charts: a bar chart on which the factors are plotted in decreasing order of frequency along the horizontal axis.
      - Use **Example 2.2**
   d. Scatter diagrams: a plot of two variables showing whether they are related.
   e. Cause-and-effect diagram: relates a key performance problem to its potential causes (sometimes called a *fishbone diagram*).

- Use **Example 2.3**

f. Graphs: representations of data in a variety of pictorial forms, such as line and pie charts.

- Line charts (see the "Quality and Performance" Chapter)
- Forecasting (see Chapter 8, "Forecasting")

6. Data snooping
   a. The power of the data analysis tools is greatest when they are used together.
   b. Data snooping is the use of the tools to sift data, clarify issues and deduce causes.
   c. Use **Example 2.4**
7. Simulation
   a. The act of reproducing the behavior of a process using a model that describes each step of the process.
   b. Shows how the process performs dynamically over time.
   c. See **Supplement E**, "Simulation"

7. Redesigning and Managing Process Improvements

1. Questioning and Brainstorming
   a. A questioning attitude: ask six questions about each step in the process
      - *What* is being done?
      - *When* is it being done?
      - *Who* is doing it?
      - *Where* is it being done?
      - *How* is it being done?
      - *How* well does it do on the various metrics of importance?

TEACHING TIP
For each question, ask why? As time permits, have the class "brainstorm" Solved Problem 2 on changing auto engine oil. Have students shout out their ideas in rapid fire manner without time lost just yet for evaluation.

2. Creativity can be stimulated by having a brainstorming session: a time when a group of people, knowledgeable on the process propose ideas for change by saying whatever comes to mind
3. Benchmarking: focuses on setting quantitative goals for improvement
   a. Competitive benchmarking is based on comparisons with a direct industry competitor.
   b. Functional benchmarking compares areas such as administration, customer service, and sales operations with those of outstanding firms in any industry.

c. Internal benchmarking involves using an organizational unit with superior performance as the benchmark for other units.

4. Implementing: Seven mistakes to avoid in managing processes:
    a. Not connecting with strategic issues
    b. Not involving the right people in the right way
    c. Not giving the design teams and process analysts a clear charter, and then holding them accountable
    d. Not being satisfied unless fundamental "reengineering" changes are made
    e. Not considering the impact on people
    f. Not giving attention to implementation
    g. Not creating an infrastructure for continuous improvement