Lesson 03 – Productivity, Competitiveness, & Strategy

Three separate but related topics extremely important to business success

A Cold Hard Fact
Better quality, higher productivity, lower costs, and the ability to respond quickly to customer needs are more important than ever and…
the bar is getting higher

Productivity
A measure of the effective use of resources, usually expressed as the ratio of output to input.

\[
\text{Productivity} = \frac{\text{Output}}{\text{Input}}
\]

Productivity measures can be computed for a single operation, a department, an organization, or even an entire country.
Productivity measures are useful for tracking performance over time (they tell whether performance is improving or not)
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**Single Factor (Partial) Productivity Measures**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Productivity</td>
<td>Units of output per labor hour, units of output per shift, value-added per labor hour, dollar value of output per labor hour</td>
</tr>
<tr>
<td>Machine Productivity</td>
<td>Units of output per machine hour, dollar value of output per machine hour</td>
</tr>
<tr>
<td>Capital Productivity</td>
<td>Units of output per dollar ($), dollar value of output per dollar input</td>
</tr>
<tr>
<td>Energy Productivity</td>
<td>Units of output per kilowatt-hour, dollar value of output per kilowatt-hour</td>
</tr>
</tbody>
</table>

**Example 2:** Develop a productivity measure for

a. 4 workers who install 720 yards of carpeting in 8 hours

\[
\text{Output} = \frac{720 \text{ yards}}{8 \text{ hours}} = 90 \text{ yards/hour}
\]

b. 1 machine produces 68 usable pieces in 2 hours

\[
\text{Output} = \frac{68 \text{ pieces}}{2 \text{ hours}} = 34 \text{ pieces/hour}
\]

**Multi-factor Productivity Measures**

[Diagram showing the interrelation of labor, capital, technology, and energy]
Example 3: Develop a productivity measure for the combined input of labor and machine time using the following data:

Output: 7,040 units
Inputs: Labor - $1,000, Materials - $520, Overhead - $2,000

\[
\text{Multi-factor Productivity Measures} \\
\frac{\text{Output}}{\text{Labor + Material + Overhead}} = \frac{7,040}{1,000 + 520 + 2,000} = 2 \text{ units/input} \\
\]

Example 4 (not in textbook): Develop the following productivity measures for a product that utilizes labor and machine time. Assume 10,000 units are produced in 500 hours and are sold for $10/unit. The labor rate is $9/hour.

**Option 1:** Productivity as a measure of units.

- Output Units: 10,000
- Labor Hours: 500
- Productivity = \( \frac{10,000}{500} = 20 \text{ units/hour} \)

**Option 2:** Productivity as a measure of $

- Output $ = 10,000 \times 10 = 100,000
- Labor $ = 500 \times 9 = 4,500
- Productivity = \( \frac{100,000}{4,500} = 22.2 \text{ Output$/Input$} \)

Can you think of any advantages or disadvantages for each option?

Example 5: Develop a productivity measure for a product that utilizes labor, machine time, raw materials and purchased materials. Assume 10,000 units are produced in 500 hours and are sold for $10/unit. The labor rate is $9/hour, the cost of the raw materials is $5,000 and the cost of purchased materials is $25,000.

\[
\text{Output} = 10,000 \times 10 = 100,000 \\
\text{Input} = 500 \times 9 + 5,000 + 25,000 = 34,500 \\
\text{Output} = 100,000 \times 2.9 = 290,000 \\
\text{Output} = 34,500 \]

Can you think of any advantages or disadvantages for each option?
Multi-factor Productivity Measures

Example 6: Develop a productivity measure for a product that utilizes labor machine time, raw materials and purchased materials. Assume 5,000 units are produced in 500 hours and are sold for $30/unit. The labor rate is $25/hour, the cost of the materials is $5,000 and the cost of overhead is 2X labor cost.

\[
\text{Multi-factor Productivity} = \frac{\text{Output}}{\text{Labor + Material + Overhead}}
\]

\[
\begin{align*}
\text{Output} &= 5,000 \text{ units} \\
\text{Labor} &= 500 \text{ hours} \\
\text{Material} &= $5,000 \\
\text{Overhead} &= 2 \times \text{Labor} = 2 \times (500 \times $25) = $50,000 \\
\end{align*}
\]

\[
\text{Multi-factor Productivity} = \frac{5,000 \times $30}{500 \times $25 + $5,000 + $100,000} = \frac{150,000}{150,000} = 3.5294
\]

Why Have Productivity Measures?

Productivity measures are very important and useful to the operations manager because they:

- Are critical to the planning process
- Are performance scorecards for departments/organizations
- Track performance over time
- Indicate where improvements must be made
- Show how much improvement is achieved

Caution must be used when interpreting productivity measures: the situation and conditions under which a productivity measure is created may not be relative to another set of conditions or situation.

Productivity Improvements

Productivity improvements are necessary to remain competitive. One of the production managers responsibilities is to seek out productivity improvements on a routine basis. Productivity improvements can result when organizations:

- Become more efficient
- Downsize
- Expand
- Retrench
- Achieve breakthroughs
Example 7: Suppose you are a newly hired employee for a carpet retail store and are given the assignment of planning carpet installation projects. You are given the following productivity measure for a carpet installation team.

Productivity = 22.5 yards/hour

What would you need to know in order to use this productivity measure?
Measuring Productivity Growth/Decline %

Productivity Growth/Decline

\[ \frac{\text{Current productivity} - \text{Previous productivity}}{\text{Previous productivity}} \times 100\% \]

Be sure to always explain whether productivity is growing or declining.

Example 8: Labor productivity on the ABC assembly line was 25 units per hour in 2009. In 2010, labor productivity was 23 units per hour. What was the productivity growth/decline from 2009 to 2010?

Productivity Decline = \( \frac{23 - 25}{25} \times 100\% = -8\% \)

Difficulties Developing Productivity Measures

Difficulties in developing productivity measures

- Identifying and prioritizing (Pareto) the factors that most affect output
- Not all factors are measurable in a quantitative way (e.g., creativity - invention of the automatic transmission)
- Assuring that the productivity measure will allow for identification of improvement opportunities

How to Improve Productivity

To improve productivity

- Develop productivity measures for each operational department (measurement is the key ingredient in managing and controlling operations)
- Determine critical operations by looking at the system as a whole to see how interrelationships or bottlenecks affect productivity
How to Improve Productivity

To improve productivity (continued)

. Develop methods for soliciting improvement ideas (workers, teams, benchmarking competition, "best" industry practices, consultants)
. Establish reasonable goals for improvement (remember the journey of 1000 miles begins with the first step - don’t turn people off by creating impossible tasks - break them up into bite sized chunks)
. Make it clear that management supports improvement ideas and consider incentives for contributors
. Publicize productivity measures and make sure they are understood

How to Improve Productivity

To improve productivity (continued)

. Do not confuse efficiency with productivity - efficiency deals with the best way to do a job with the current tools - productivity deals with the best way to do a job and may require operational changes, capital investments or retraining

Competitiveness

Competitiveness is a measure of how well an organization performs relative to others who offer similar goods/services.

Measures of Competitiveness

. Market Share
. Profitability
. Growth
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**Competitiveness**

Businesses compete on many fronts
- Price
- Quality
- Product differentiation
- Flexibility & service
- Delivery speed
- Delivery reliability
- Ability to cope with changes in demand
- New product introduction

**Reasons for Failure**

- Too much emphasis on short-term financial performance at the trade-off of research and development
- Failure to identify distinctive competencies (strengths and weaknesses) and failure to capitalize on the strengths while improving the weaknesses
- Failure to recognize competitive threats (e.g., apparel industry)
- Too much emphasis on product/service design and not enough on the process of producing the product/service
- Neglecting investments in both capital and human resources
- Failure to establish good internal communications system and cooperative environment between different functional areas
- Failure to consider customer wants and needs

**Strategic Planning**

Mission → Strategy → Tactics

addresses the following questions
- Why do you exist?
- Where are you?
- Where do you want to go?
- How will you get there?

The development of a strategic plan begins with setting priorities.
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Elements of a Strategic Plan

- **Mission** - why the organization exists
- **Mission Statement** - a clear statement of purpose
- **Situation Analysis** - current and future analysis of external and internal factors that can affect your future
- **Goals/Objectives** - what the organization wants to accomplish typically with a time frame in mind
- **Strategy** - a plan for achieving the goals/objectives
- **Tactics** - the actions to accomplish strategy
- **Operations** - executing the action items

Hierarchy of Planning & Decision Making

Situational Analysis (Where are you?)

An objective assessment of an organizations current and future situation relative to

- **Competition** – what they currently do or have plans to do
- **Distinctive competencies** – what the organization does well and gives it a competitive advantage
- **SWOT** – a comparison of your strengths, weaknesses, opportunities and threats versus your competitors
- **External and internal factors**
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External and Internal Factors

**External**
- economic conditions
- political conditions
- legal environment
- technology
- competition
- markets
- other

**Internal**
- human resources
- facilities and equipment
- financial resources
- customers
- products/services
- technology
- suppliers

Strategic Planning Model

- Market analysis - segmentation, needs assessment
- Socio-economic, political and business environment

- Corporate Strategy - mission, goals, competencies
- Competitive priorities - Cost, quality, time, flexibility, etc.
- Capabilities - current, needed, plans, SWOT

Functional area strategies
- Finance, Operations, Marketing

Operations Strategy

- Marketplace
  - Corporate Strategy
  - Finance Strategy
  - Operations Strategy
  - Marketing Strategy

- Operations Management
  - Planning & Control
    - People
    - Plants
  - Processes
  - Outputs

Production System (5 P’s of Operations Management)
Operations Strategies

Quality-based strategies
- Focus on quality at the source in all phases of an organization

Time-based strategies
- Focus on reduction of time needed to accomplish tasks

Production-based strategies
- Focus on processes, flow, machinery, automation

Time Based Strategies

Focus on the time needed to accomplish tasks. Some critical areas are:

- Planning time - the time needed to react to a competitive threat, to develop strategies and select tactics, to approve proposed changes to facilities, to adopt new technologies
- Product/Service design time - the time needed to develop and market new or redesigned products or services
- Processing time - the time needed to produce goods or provide services
- Changeover time - the time needed to change from one type of product to another
- Delivery time - the time needed to fill orders
- Response time for complaints - either from customers or employees

Time Based Strategies

<table>
<thead>
<tr>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Designing</td>
<td>Processing</td>
<td>Changeover</td>
<td>On time!</td>
<td>Delivery</td>
</tr>
</tbody>
</table>

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Production Strategies

Focus the transformation process

- **Craft production** – highly skilled workers use simple flexible tools to produce small quantities of customized goods
- **Mass production** – lower skilled workers use specialized machinery to produce high volumes of standardized products
- **Lean production** – uses minimal amounts of resources to produce high volume of high quality goods
- **Just-in-time production** – concentrates on getting the right part to the right place at the right time

Production Strategies

- A top-down management system that organizations can use to clarify their vision and strategy and transform them into action
  - Develop objectives
  - Develop metrics and targets for each objective
  - Develop initiatives to achieve objectives
  - Identify links among the various perspectives
    - Finance
    - Customer
    - Internal business processes
    - Learning and growth
  - Monitor results

Homework

Read and understand all material in the chapter.

Discussion and Review Questions

Recreate and understand all classroom examples

Exercises on chapter web page