Productivity

Mohammad Muzammil
Professor, MED
Aligarh Muslim University

Efficiency, Productivity & Effectiveness

- *Efficiency: Involves comparison to a standard, usually time-based (for example: how long employee takes to perform specific task)*
- *Focus on inputs rather than outcomes*
- *Productivity: Involves financial valuation of outputs to inputs*
- *Consistent delivery of outcomes desired by customers should command higher prices*
- *Effectiveness: Degree to which firm meets goals*
- *Cannot divorce productivity from quality and customer satisfaction*

What is productivity?

- Productivity is a common measure of how well resources are being used or a measure of the effective use of resources usually expressed as

$$\textit{Productivity} = \frac{\textit{Output}}{\textit{Input}}$$

Characteristics of Goods

Tangible product

Consistent product definition

Production usually separate from consumption

Can be inventoried

Low customer interaction

Characteristics of Service

Intangible product

Produced and consumed at same time

Often unique

High customer interaction

Inconsistent product definition

Often knowledge-based

Frequently dispersed

Goods Versus Services

Attributes of Goods (Tangible Product)	Attributes of Services (Intangible Product)
Can be resold	Reselling unusual
Can be inventoried	Difficult to inventory
Some aspects of quality measurable	Quality difficult to measure
Selling is distinct from production	Selling is part of service
Product is transportable	Provider, not product, is often transportable
Site of facility important for cost	Site of facility important for customer contact
Often easy to automate	Often difficult to automate
Revenue generated primarily from tangible product	Revenue generated primarily from the intangible service

Types of Productivity

- Manufacturing Productivity
- Service Productivity

Why to measure Productivity

- Tracking an operating unit’s performance over time
- Judging the performance of an entire industry
- Motivate and reinforce performance

Why Productivity Matters?

- High productivity is linked to higher standards of living.
- Higher productivity relative to the competition leads to competitive advantage in the marketplace.
- For an industry, high relative productivity makes it less likely it will be supplanted by another industry.

Measures of productivity

Partial measures OR Single Factor

$$\frac{Output}{Labour}, \frac{Output}{Machine}, \frac{Output}{Capital}, \frac{Output}{Energy}$$

Multifactor measures

$$\frac{Output}{Labout+Machine}, \frac{Output}{Labour+Capital}$$

Total measures

$$\frac{Goods\ or\ Services\ produced}{All\ input\ used\ to\ produce\ them}$$

Partial Productivity

- Ratio of output to one class of input.
- Its significance lies in its focus on utilization of one resource.

Examples

Labor Productivity	Units of output per labor hour Units of output per shift Value-added per labor hour
Machine Productivity	Units of output per machine hour Value-added/machine hour
Capital Productivity	Units of output per unit of money input Money value of output per unit of money input
Energy Productivity	Units of output per kilowatt-hour Money value of output per kilowatt-hour

Multi-factor Model of Productivity

- Ratio of output to two or more input factors.
- Multi-factor Productivity Measurement Model generally considers labour, material and energy as major inputs.
- Capital was deliberately left out as it is most difficult to estimate how much capital is being consumed per unit/ time.

Total Productivity Model

- Total Productivity Model considers 5 items as inputs.
- These are Human, Material, Capital, Energy and other expenses.
- This model can be applied in any manufacturing or service organization.

Total Productivity

$$= \frac{\textit{Total Tangible Output}}{\textit{Total Tangible Input}}$$

- Total tangible output = *Value of finished units produced + partial units produced + Dividends from securities + Interests from bonds + Other incomes.*

- Total tangible inputs = *Value of human inputs + capital inputs+ materials purchased + energy inputs + other expenses (taxes, transport, office expenses etc.).*

Total Factor Productivity
Advantages & Disadvantages

Advantages	Disadvantages
All quantifiable inputs are considered.	Data is difficult to compute.
Sensitivity analysis can be done.	Does not consider intangible factors of input and output.
Provides both firm level and operational unit level productivity.	

Factors Affecting Productivity

- Technology
- Labor turnover, layoffs, new workers
- Training of employees & their Safety
- Facility location and layout
- Capacity utilization
- Inventory
- Incentive plans

Service Productivity

- Typically labor-intensive
- Frequently individually processed
- Often an intellectual task is performed by professionals
- Often difficult to mechanize or automate
- Intangible nature of many service elements makes it hard to measure service productivity

Measuring Service Productivity:
Variability Is a Major Problem

- Traditional measures of service output tend to ignore variations in quality or value of service
- Focus on outputs rather than outcomes,
- Stress efficiency but not effectiveness,
- Firms that consistently deliver outcomes desired by customers can command higher prices.

Improving Service Productivity: Operations-driven Strategies

- Control costs, reduce waste
- Set productive capacity to match average demand
- Automate labor tasks
- Upgrade equipment and systems
- Train employees
- Broadening array of tasks that a service worker can perform
- Leverage less-skilled employees through expert systems
- Service process redesign

Improving Service Productivity: Customer-driven Strategies

- Change timing of customer demand
  - By shifting demand away from peaks, better use of firm's productive assets may be made
  - Involve customers more in production
- Get customers to self-serve
  - Encourage customers to buy from firm's corporate websites
  - Ask customers to use third parties
- Delegate delivery intermediary organizations

Thanks