
Operations Management

Operations and Productivity Chapter 1

What is Operations Management?

- “ *Production* is the creation of goods and services
- “ *Operations management* is the set of activities that creates goods and services through the transformation of inputs into outputs

Contributions from

- Human Factors
- Industrial Engineering
- Management Science
- Biological Science
- Physical Sciences
- Information Science

Significant Events in OM

- **Division of labor (Smith, 1776)**
- **Standardized parts (Whitney, 1800)**
- **Scientific Management (Taylor, 1881)**
- **Coordinated assembly line (Ford 1913)**
- **Gantt charts (Gantt, 1916)**
- **Motion Study (the Gilbreths, 1922)**
- **Quality control (Shewhart, 1924)**

Significant Events - Continued

- **CPM/PERT (DuPont, 1957)**
- **MRP (Orlicky, 1960)**
- **CAD**
- **Flexible manufacturing systems (FMS)**
- **Manufacturing Automation Protocol (MAP)**
- **Computer Integrated Manufacturing (CIM)**

Why Study OM?

- OM is one of three major functions (*marketing, finance, and operations*) of any organization
- We want (*and need*) to know how goods and services are produced
- We want to know what operations managers do
- OM is such a costly part of an organization

What Operations Managers Do

- Plan
- Organize
- Staff
- Lead
- Control

Ten Critical Decisions

- Managing quality
- Design of goods and services
- Location strategies
- Layout strategies
- Human resources
- Supply-chain management
- Inventory management
- Scheduling
- Maintenance

The Critical Decisions

- *Quality management*
 - Who is responsible for quality?
 - How do we define quality?
- *Goods and services design*
 - What product or service should we offer?
 - How should we design these products and services?

The Critical Decisions - continued

• *Process and Capacity design*

- What processes will these products require and in what order?
- What equipment and technology is necessary for these processes?

• *Location*

- Where should we put the facility
- On what criteria should we base this location decision?

The Critical Decisions - continued

• *Layout design*

- How should we arrange the facility?
- How large a facility is required?

• *Human resources and job design*

- How do we provide a reasonable work environment?
- How much can we expect our employees to produce?

The Critical Decisions - continued

- *Supply chain management and JIT “Just-in-time” Inventory, Material Requirements Planning*
 - Should we make or buy this item?
 - Who are our good suppliers and how many should we have?
 - How much inventory of each item should we have?
 - When do we re-order?

The Critical Decisions - continued

- *Immediate, short term, and project scheduling*
 - Is subcontracting production a good idea?
 - Are we better off keeping people on the payroll during slowdowns?
- *Maintenance*
 - Who is responsible for maintenance?

Organizational Functions

- *Marketing* - generates demand or at least takes the order for a product or service
- *Operations* - creates the product
- *Finance/accounting* - tracks how well the organization is doing, pays the bills, collects the money

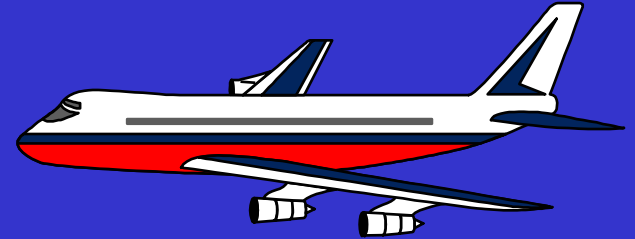
Organizational Functions

- Marketing
 - Gets customers
- Operations
 - creates product or service
- Finance/Accounting
 - Obtains funds
 - Tracks money

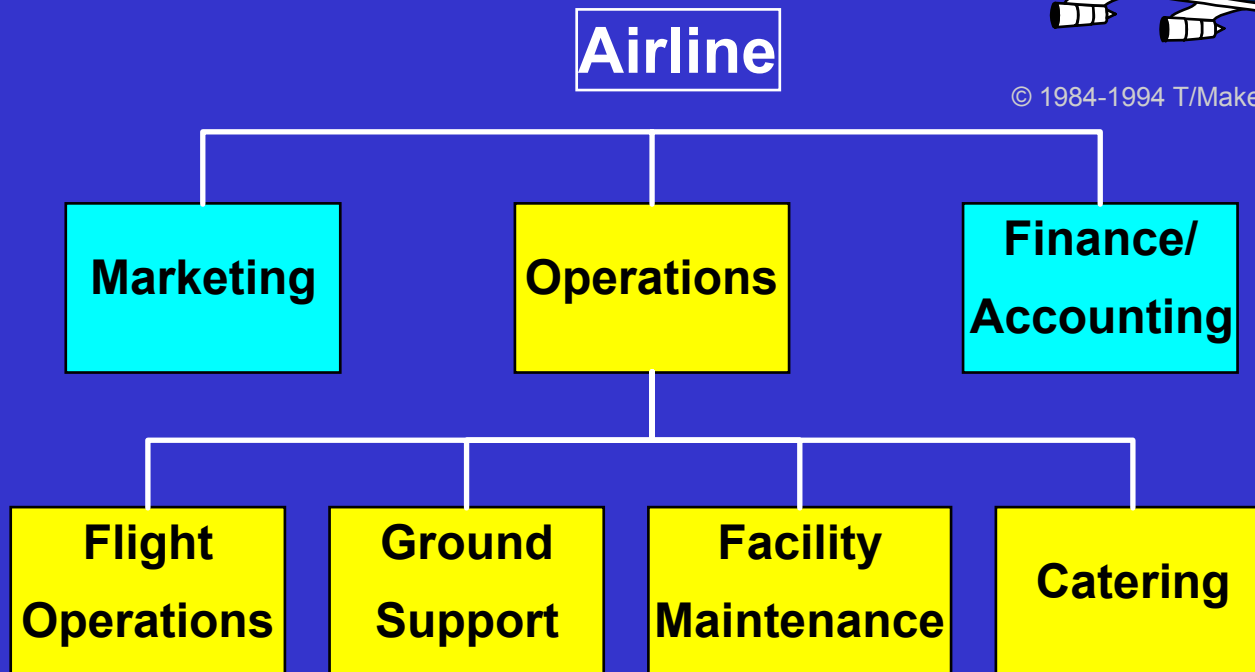


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Functions - Airline



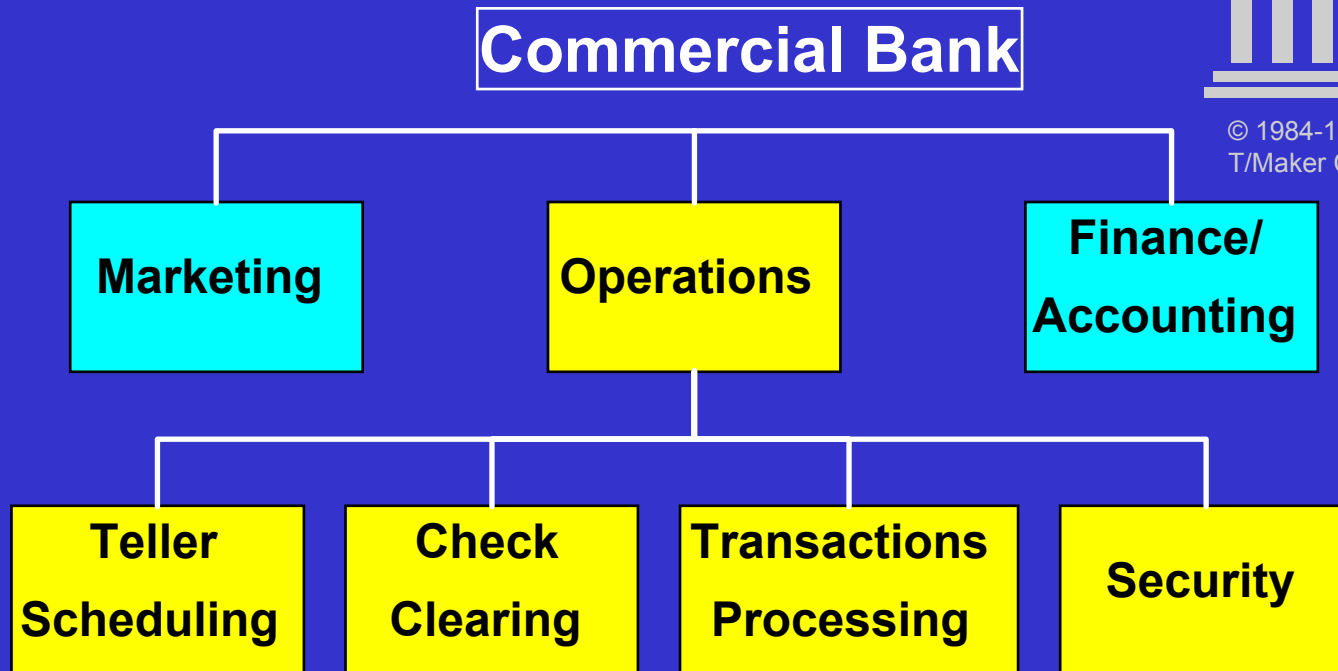
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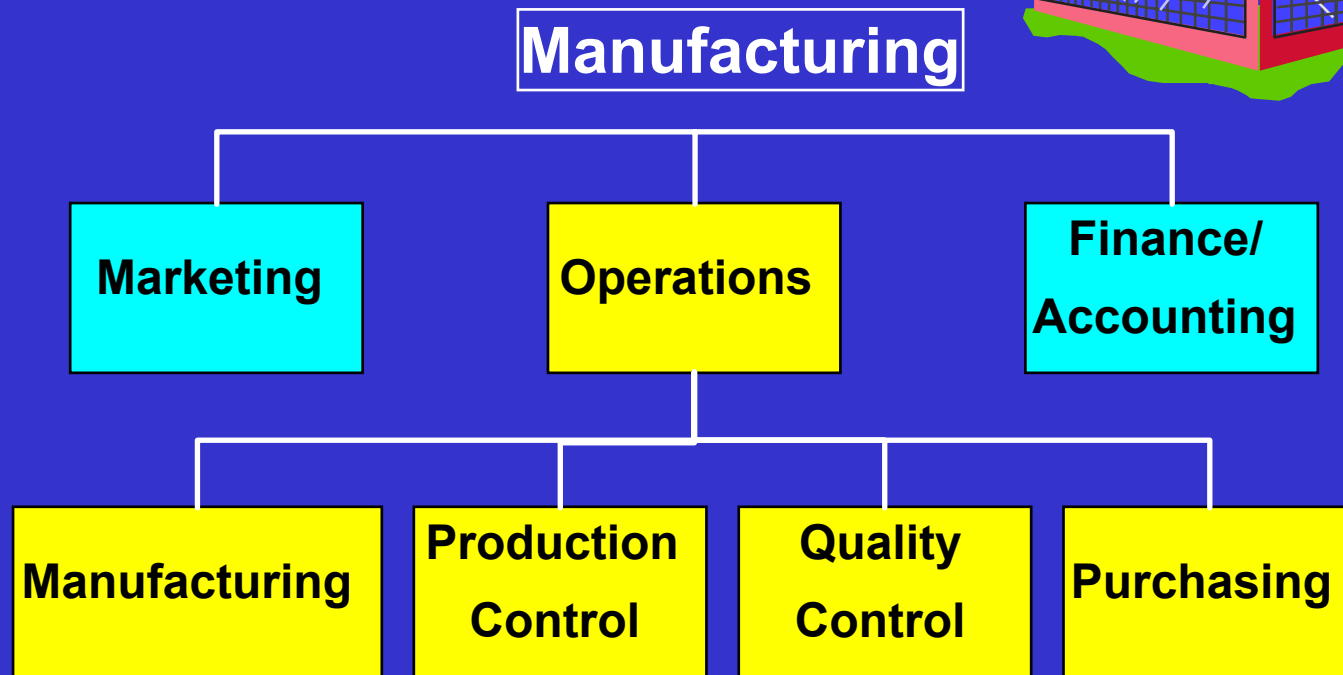
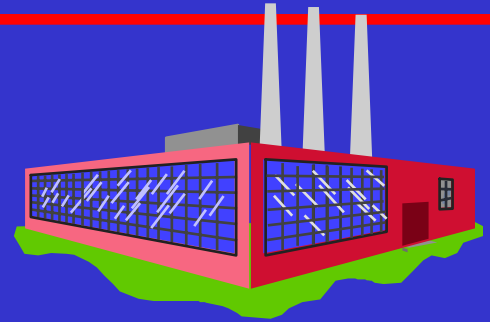
Functions - Bank



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Functions - Manufacturer



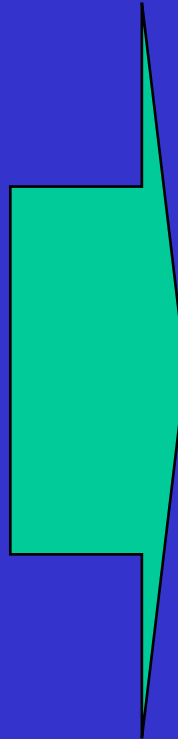
Where are the OM Jobs?

- Technology/methods
- Facilities/space utilization
- Strategic issues
- Response time
- People/team development
- Customer service
- Quality
- Cost reduction
- Inventory reduction
- Productivity improvement

New Challenges in OM

From

- Local or national focus
- Batch shipments
- Low bid purchasing
- Lengthy product development
- Standard products
- Job specialization



To

- Global focus
- Just-in-time
- Supply chain partnering
- Rapid product development
- Mass customization
- Empowered employees

Characteristics of Goods

- Tangible product
- Consistent product definition
- Production usually separate from consumption
- Can be inventoried
- Low customer interaction



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Characteristics of Service



- Intangible product
- Produced & consumed at same time
- Often unique
- High customer interaction
- Inconsistent product definition
- Often knowledge-based
- Frequently dispersed

Goods versus Services

Good

- Can be resold
- Can be inventoried
- Some aspects of quality measurable
- Selling is distinct from production

Service

- Reselling unusual
- Difficult to inventory
- Quality difficult to measure
- Selling is part of service

Goods versus Services

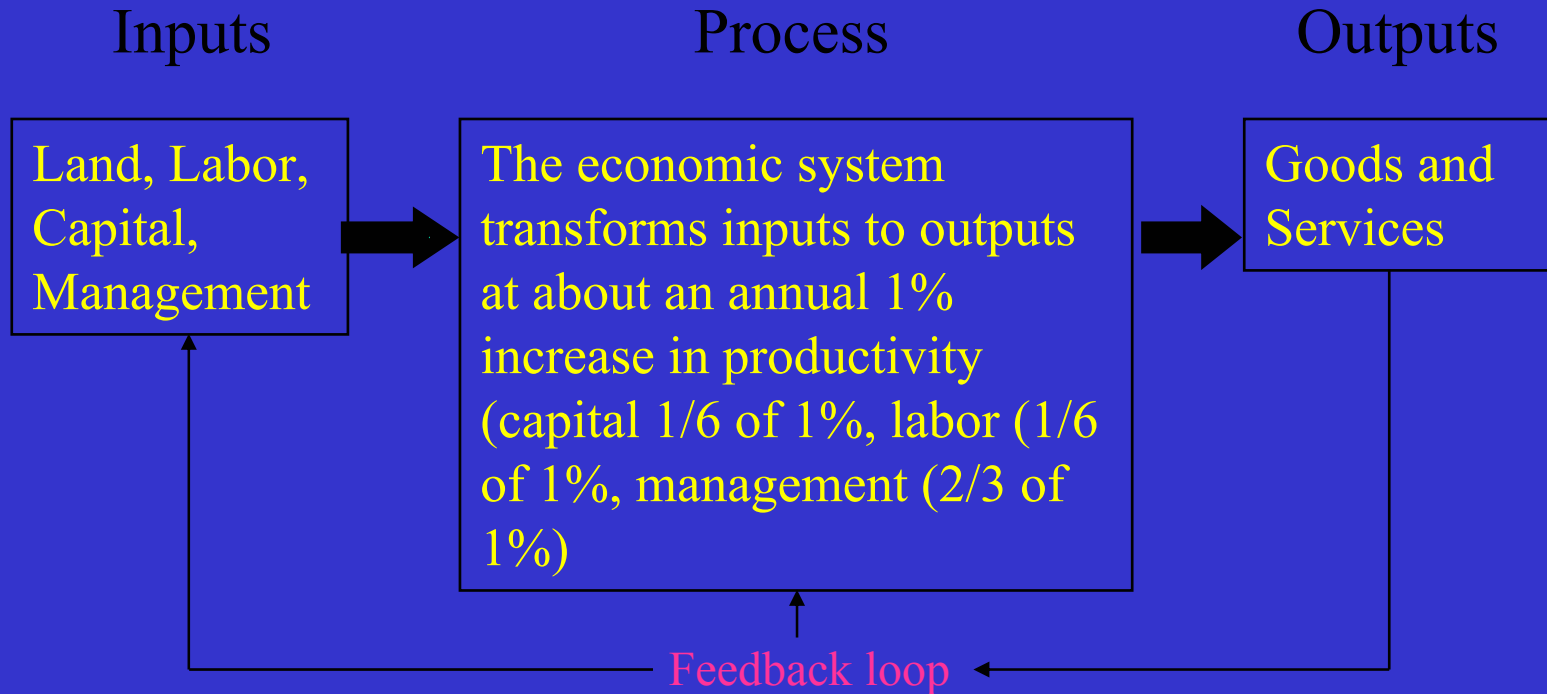
Good

- Product is transportable
- Site of facility important for cost
- Often easy to automate
- Revenue generated primarily from tangible product

Service

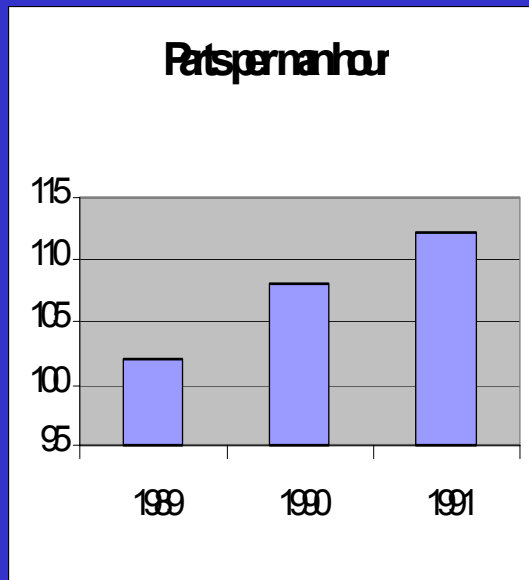
- Provider, not product is transportable
- Site of facility important for customer contact
- Often difficult to automate
- Revenue generated primarily from intangible service.

The Economic System Transforms Inputs to Outputs

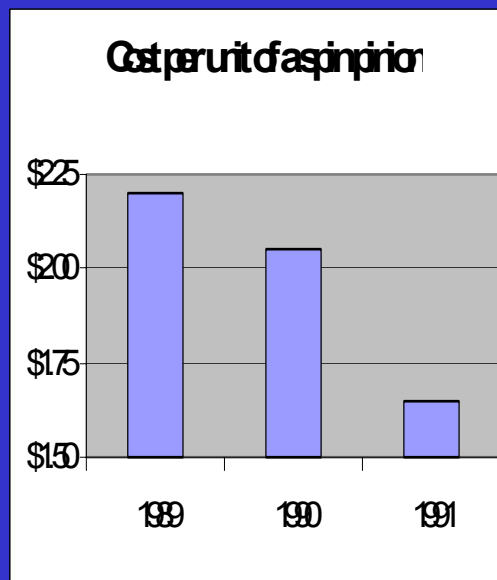


Whirlpool

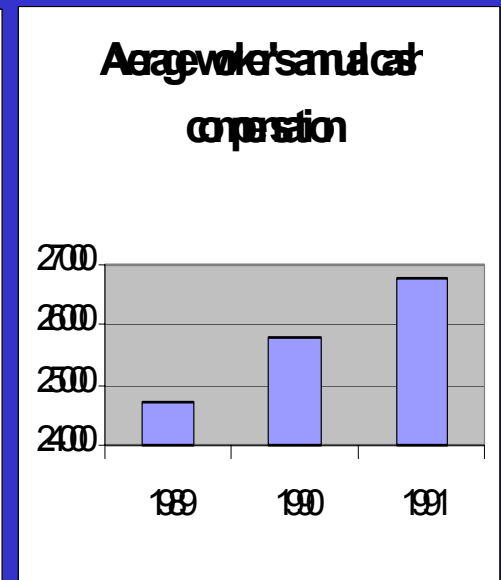
Productivity improved



Costs were pared



Wages increased



Productivity

- Measure of process improvement
- Represents output relative to input

$$\text{Productivity} = \frac{\text{Units produced}}{\text{Input used}}$$

- Productivity increases improve standard of living
- From 1889 to 1973, U.S. productivity increased at a 2.5% annual rate

Productivity Variables

$$\text{Productivity} = \frac{\text{Output}}{\text{Labor} + \text{Material} + \text{Energy} + \text{Capital} + \text{Miscellaneous}}$$

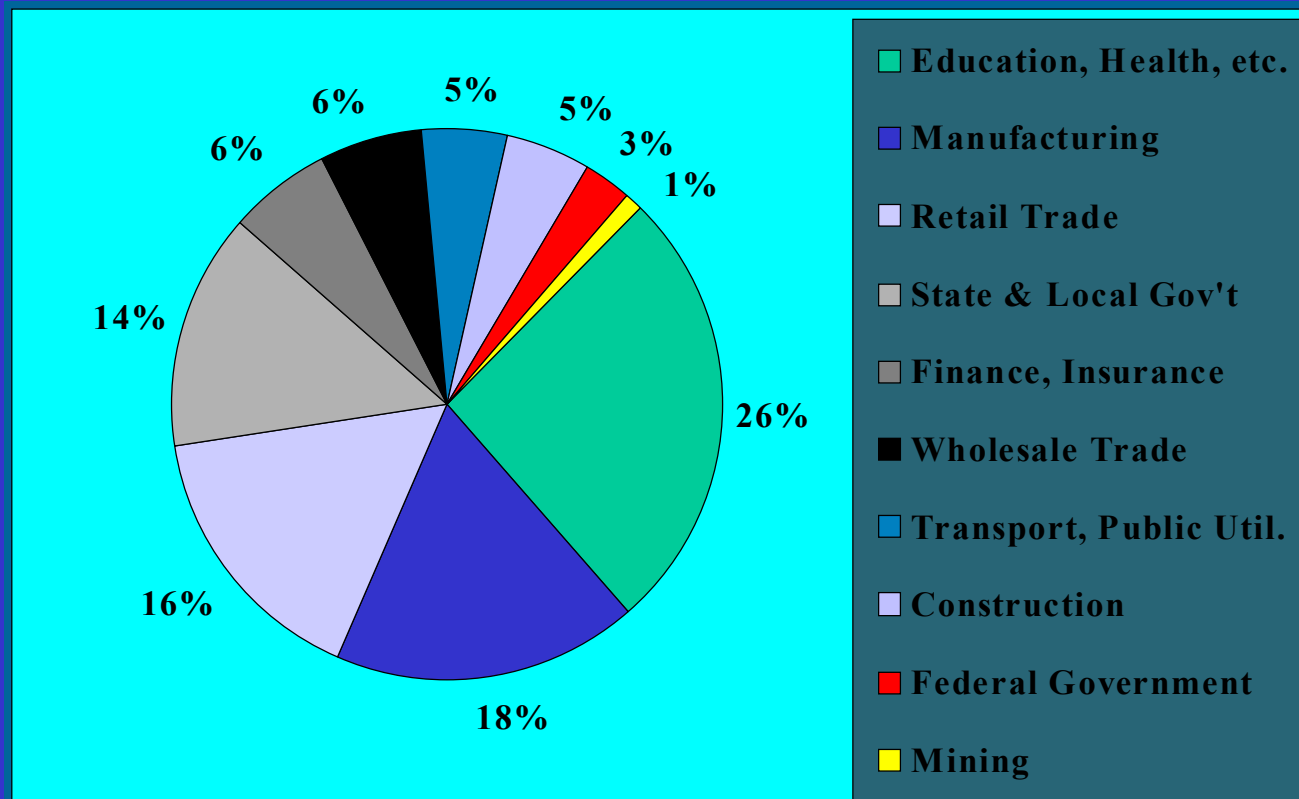
Productivity Variables

- *Labor* - contributes about 1/6 of the annual increase
- *Capital* - contributes about 1/6 of the annual increase
- *Management* - contributes about 2/3 of the annual increase

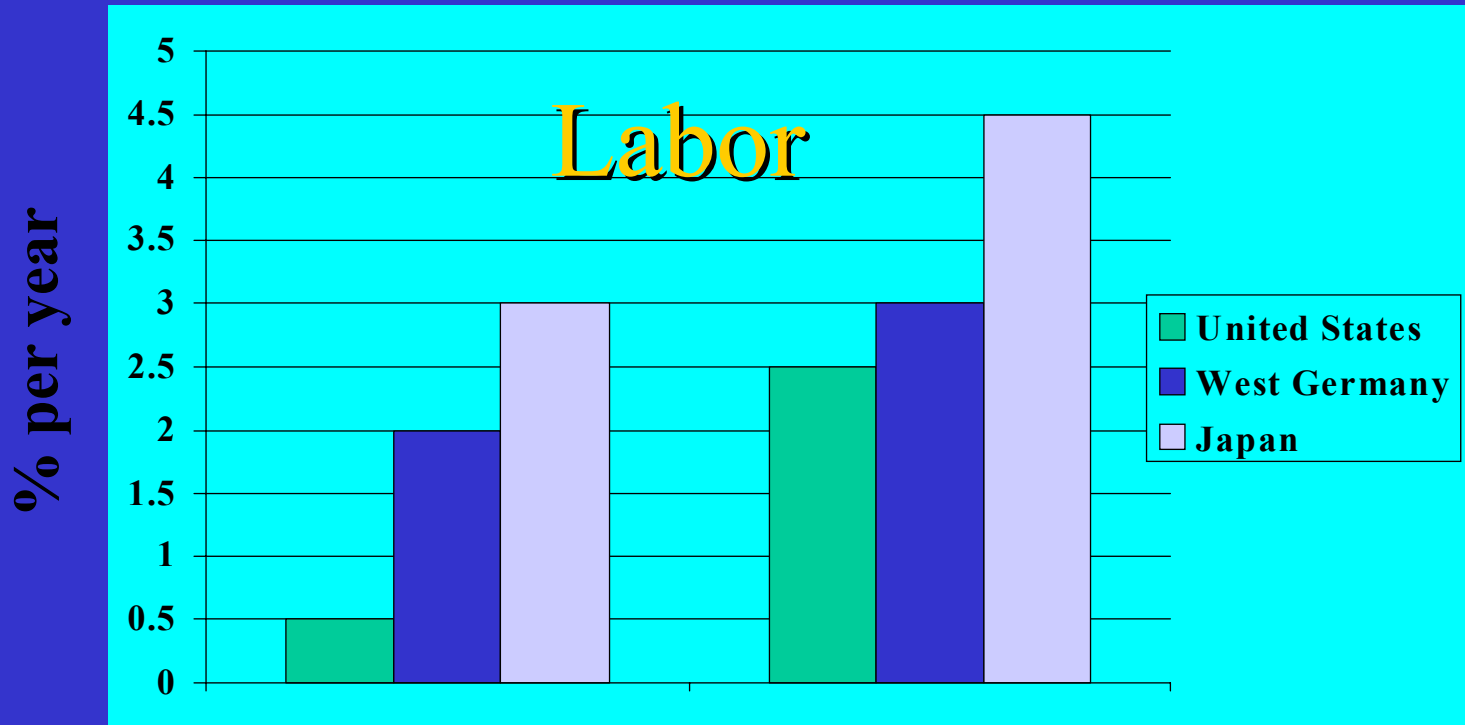
Key Variables for Improved Labor Productivity

- Basic education appropriate for the labor force
- Diet of the labor force
- Social overhead that makes labor available
- Maintaining and enhancing skills in the midst of rapidly changing technology and knowledge

Jobs in the U.S.



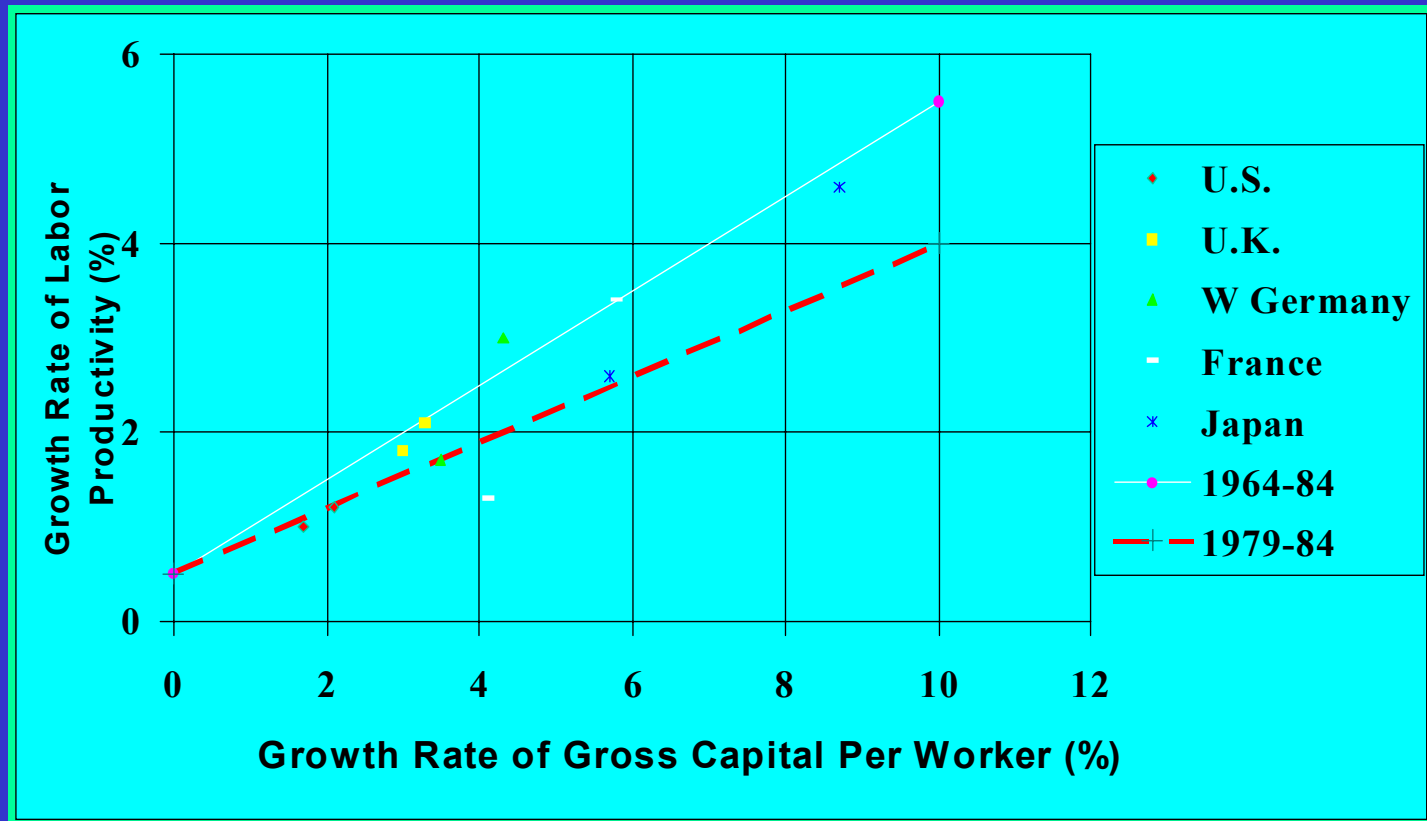
Productivity Growth 1971- 1992



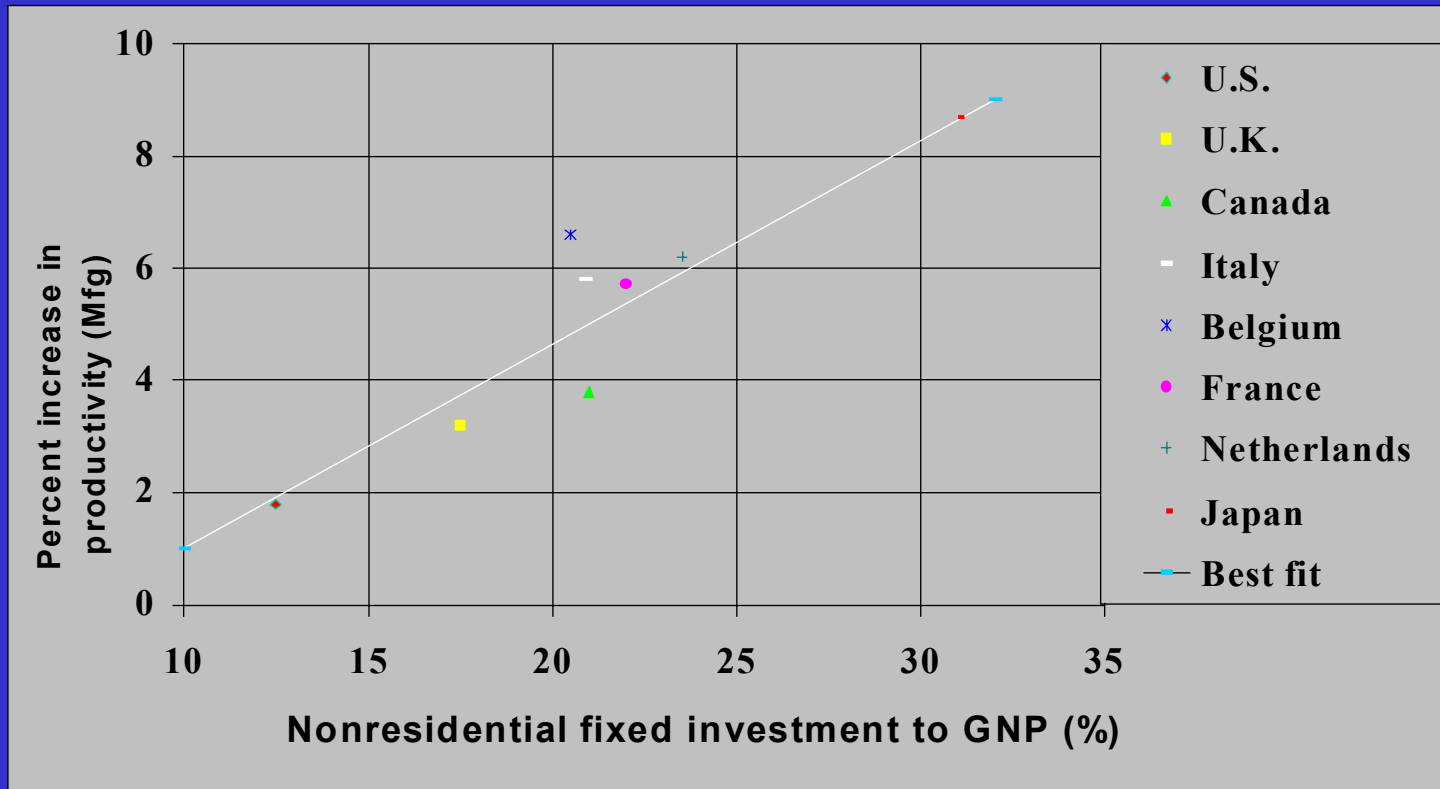
Whole Economy

Manufacturing

Growth Rate of Labor Productivity



Investment and Productivity in Selected Nations



Service Productivity

- Typically labor intensive
- Frequently individually processed
- Often an intellectual task performed by professionals
- Often difficult to mechanize
- Often difficult to evaluate for quality