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# **Operations of Manufacturing Systems**

# Production/Manufacturing Systems

- Existed since earliest days of civilization

## *Examples Include*

- Pyramids of Egypt
- Great wall of China
- Archaeological remains of cities



# Major Decisions

- Design of the product
- Location of facilities
- Scheduling of personnel
- Acquisition of materials

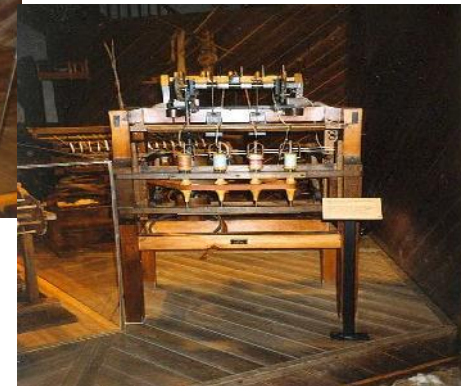
# Eighteenth Century

- Artisan work
  - Product design and production were process united in one person
    - Quality control
    - Personnel Scheduling
    - Material management
- Done from experience
- Small Markets
  - Simple distribution



# The Industrial Revolution

- Flying Shuttle
- Spinning jenny
- Water frame
- Mule spinner



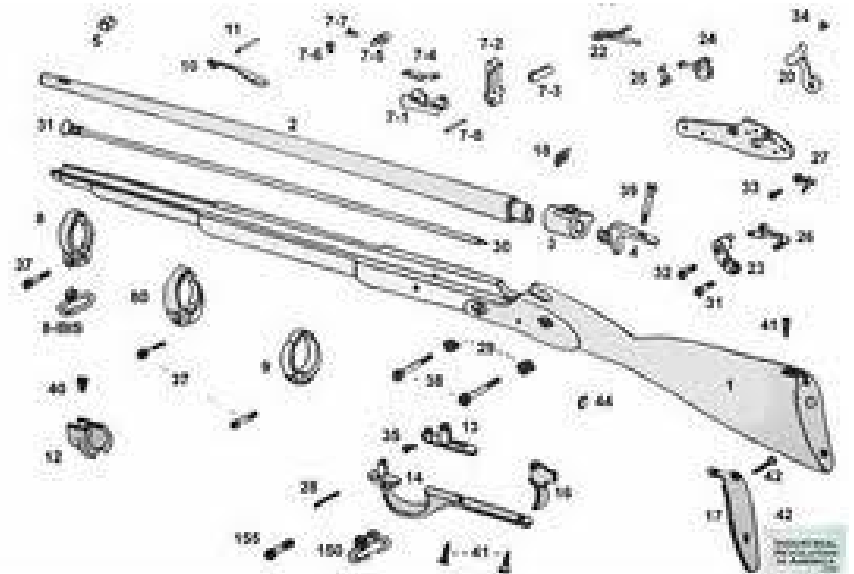
# The Industrial Revolution...

- Invention of steam engine
- Production of interchangeable parts
- Creation of machine tools



# Interchangeability of Parts

Another key development in the history of industrial engineering was the concept of inter-changeable parts  
(manufacturing of muskets and pistols for the U.S. government)





# Scientific Management

Natural Laws govern manufacturing systems

# Taylor's Philosophy

- Use scientific methods
- Right person for right job
- Exploit employees self interest
- Differentiate managers from workers

***Loading Pig Iron on rail cars***



# 1. Gilbreths 2. Henry Ford

1. “Work smarter not harder”
2. Moving Assembly line
  1. Bricklayers laid 5 times more bricks
  2. Little raw material, work in process and final inventories

# Human Relations Movement

## *Hawthorne Studies*

Experimentation ran for over 10 years.....

Level of illumination.....Employee relations

**Operation Research**

**Computers in OR**

# The Japanese Production System

- Quality comes first
- Improve product and process continuously
- Eliminate all forms of waste

**Till this slide**

“Production and Operations Management”

Joseph S. Martinich

# Operations Management?

## **Production**

Creation of Goods and services

## **Operations Management**

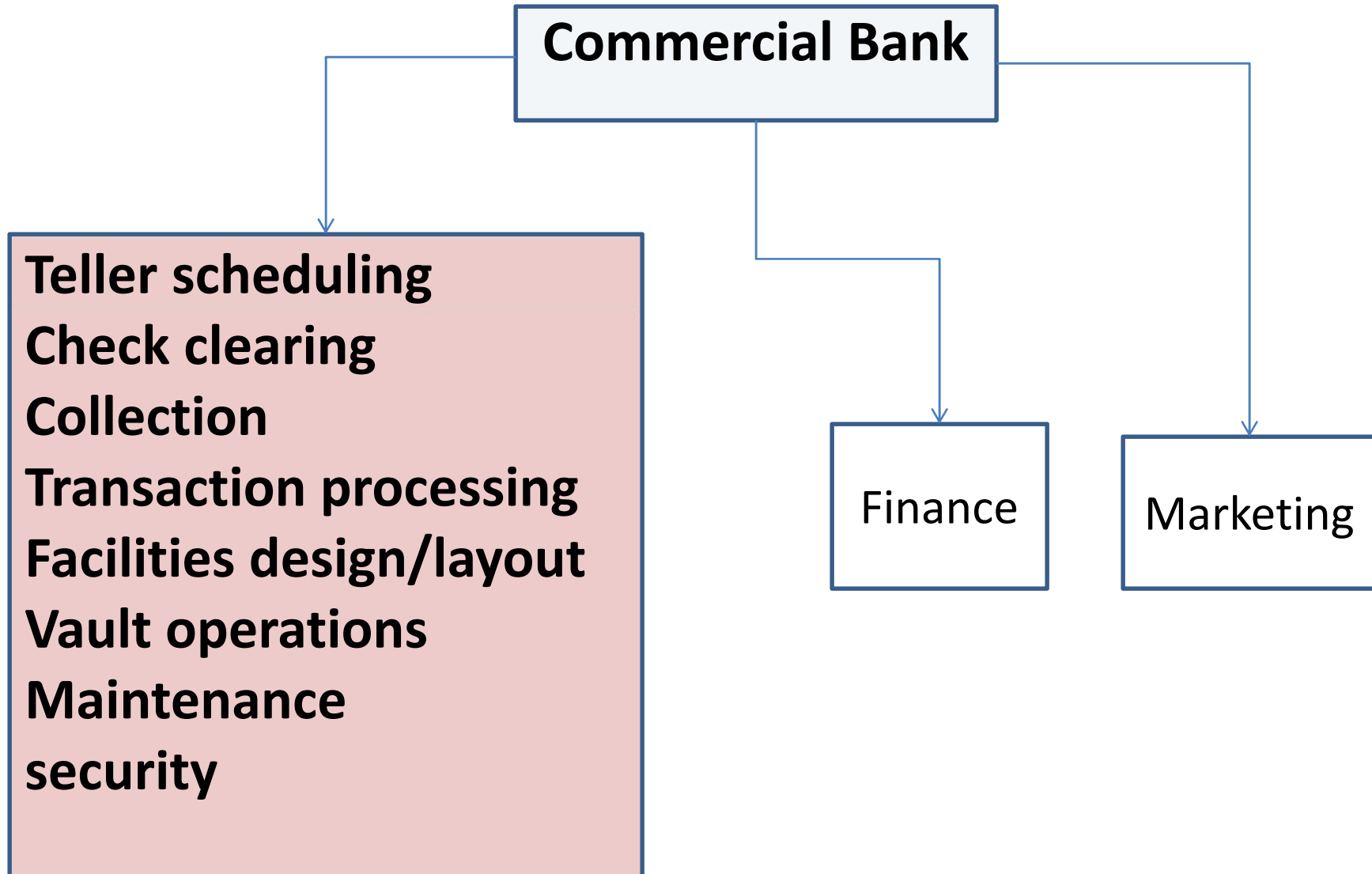
Managing the activities that are related to the creation of goods and services

# Reading Assignment

- Why Study Operations Management?
- Figure 1.2



# Application in Service/Manufacturing



# Manufacturing

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graph TD; Manufacturing[Manufacturing] --> RedBox[Facilities, Production, Inventory Control, Quality Assurance & Control, Supply Chain Management, Manufacturing (Tooling, Assembly), Design, Process Analysis]; Manufacturing --> Finance[Finance/Accounting]; Manufacturing --> Marketing[Marketing];
```

- Facilities
- Production, Inventory Control
- Quality Assurance & Control
- Supply Chain Management
- Manufacturing (Tooling, Assembly)
- Design
- Process Analysis

Finance/Accounting

Marketing

# Productivity?

The Ratio of Outputs to Inputs

Inputs can be one or more