Lecture 10

Globalization:
Chains of Production
I. Production
II. Distribution
III. Transport & Communications
I. Production

A. Globalizing Industry
B. Production Systems
C. Off-Shoring
D. Contract Manufacture
Globalized Production

- Global Divisions of Labor
  1. Global resource inputs
     1. Classic/colonial division of labor
  2. Global industrialization (N.I.C.s)
     1. Expanded trade in manufactures
        1. Ricardian division of labor
  3. Global production systems
     1. New global division of labor (production systems)

- How large is each component?
  - Trade volumes > global GDP growth
1. Global Resourcing

[Map showing global resource sourcing and transport routes]
Ricardian Global Trade

- Finished products exported around the world
Global Production Systems

- Goods made in many parts, in many places around the world

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<table>
<thead>
<tr>
<th>Component</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand</td>
<td>USA</td>
</tr>
<tr>
<td>Final Assembly and Dispatch</td>
<td>Ireland</td>
</tr>
<tr>
<td>Main Box</td>
<td>Ireland</td>
</tr>
<tr>
<td>Chips on Motherboard</td>
<td>USA, Korea, Taiwan, Philippines</td>
</tr>
<tr>
<td>Battery on Motherboard</td>
<td>Philippines</td>
</tr>
<tr>
<td>Power Supply</td>
<td>China</td>
</tr>
<tr>
<td>CD ROM Drive</td>
<td>China (assembled from Japanese Parts)</td>
</tr>
<tr>
<td>CD-R (consumables)</td>
<td>Germany</td>
</tr>
<tr>
<td>Hard Disk Drive</td>
<td>Singapore, Philippines</td>
</tr>
<tr>
<td>3.5&quot; Floppy Disk Drive</td>
<td>Netherlands (chips from USA, Korea, Taiwan)</td>
</tr>
<tr>
<td>Modem Card</td>
<td>China (chips from USA, Korea, Taiwan)</td>
</tr>
<tr>
<td>Graphics Card</td>
<td>USA</td>
</tr>
<tr>
<td>Specialist Video Card</td>
<td>UK (origin of components?)</td>
</tr>
<tr>
<td>Monitor</td>
<td>Mexico</td>
</tr>
<tr>
<td>Keyboard</td>
<td>Mexico</td>
</tr>
<tr>
<td>Mouse</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Child's Mouse</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Loudspeakers</td>
<td>Mexico</td>
</tr>
<tr>
<td>Microphone</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Inkjet Printer</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Zip Drive</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Scanner</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Webcam</td>
<td>China</td>
</tr>
<tr>
<td>Power Supplies (Peripherals)</td>
<td>Taiwan, China, Malaysia, Mexico</td>
</tr>
<tr>
<td>Manuals</td>
<td>Scotland, Ireland, Wales, Germany</td>
</tr>
<tr>
<td>Environmental Certification</td>
<td>Sweden</td>
</tr>
</tbody>
</table>
Global Shifts

- In industry after industry...
  - Off-shoring to Asia (but not only)
  - Components (but not only)

- North Carolina furniture district
  - In 1996, less than 1/3 imported
    - By 2006, 55% imported
  - Means of competing
    - Buy imported inputs
    - Reduce delivery time to a days, not weeks.

- Matera (SE Italy) furniture district
  - In 2000, 400 firms, 10,000 workers
    - By 2006, had lost about 1/3 of firms & jobs.
  - Means of competing
    - Set up operations in China
    - Upgrade fashion & branding (e.g., Ferrari)
I. Production

A. Globalizing Industry
B. •Production Systems
C. Off-Shoring
D. Contract Manufacture
What’s a Production System?

- Production systems
  - Multi-step manufacturing
  - Component-assembly systems
- Beyond the single-factory
  - Production divided between many factories
- Terms
  - systems \(=\) chains \(=\) networks
Multi-Locational Industry

- Single product, many sites
  - From location to spatial pattern
    - *Few maps of this!*

- Clustered & dispersed patterns
  - DOL *within* industrial districts
    - Cf. Lecture 9
  - DOL *across* many sites

- Global industrial geographies
  - International specializations
  - Networks of clusters/districts
I. Production

A. Globalizing Industry
B. Production Systems
C. • Off-shoring
D. Contract Manufacture
Off-Shoring

- 3 kinds of off-shoring
  - Import finished products
    - Trade vs. manufacture
  - Build factories abroad
    - US corporations
  - Buy components abroad
    - From US or foreign corps.

- 3 ways of organizing off-shore
  - Intra-firm (1/2 to 2/3ds)
    - High tech leads the way
  - Subcontracting to foreign firms
    - Long-term agreements
  - Contract manufacture
    - Finished products

Source: Bardhan, Jaffee and Kroll
Outsourcing

- Off-shoring vs. outsourcing
  - Geography vs. organization
- Forms of outsourcing
  - ‘Off the shelf’ (open market)
  - ‘Subcontracting’ (ongoing relation) [≠ outsourcing]
- Formal & informal subcontracting
  - Legal vs. personal (trust)
    - Line is often fuzzy
- Subcontracting networks
  - Lead firms (OEMs)
  - Multi-level systems of components
Logic of Outsourcing

- In-house or outsource?
  - ‘Buy or make’? (Ronald Coase)
- Efficiency
  - Economies of scope
- Quantity & risk
  - Rapid expansion & contraction of supply
- Labor cost & control
  - Low wage suppliers (local or global)
  - Escape contracts, obligations
I. Production

A. Globalizing Industry
B. Production Systems
C. Off-Shoring
D. •Contract Manufacture
Contract Manufacturing

- **Beyond inputs & components**
  - Subassemblies
  - Whole products

![Diagram](image)

Figure 1. From Vertical Integration to Value Chain Modularity: The De-linking of Product Innovation from Manufacturing in the Modular Network
New Division of Labor

- Lead firms (OEMs)
  - R&D, design, specs
  - Brand, marketing, distribution

- Contract manufacturers (CMs)
  - Production design & engineering
  - Subcontract parts & machinery

- High tech leads the way

Motorola to Send $30 Billion Worth Of Manufacturing to Flextronics

Motorola Inc., the No. 2 maker of cellular phones, said Singapore's Flextronics International Ltd. will make some of its phones, pagers and electronics equipment in a five-year, $30 billion contract.

Motorola also will buy 11 million Flextronics shares, or about 5 percent of the company, for about $100 million, or $9 a share. That's 82 percent less than Tuesday's close.

Flextronics rose $4.38 to $54.44, yesterday after more than doubling in the past year. Motorola lost $2.69 to $91.75.

With cell phone sales forecast to surge by almost two-thirds to 400 million this year, Motorola wants to secure the manufacturing it needs to compete with No. 1 Nokia Oyj. The agreement also will help Motorola reduce costs, analysts said.

"This shows Motorola's resolve in getting its cost structure correct and its margins on handsets higher," said David Katz, chief investment officer for Matrix Asset Advisors Inc., which owns more than 75,000 Motorola shares.

The agreement, which includes the production of cases and television sets as well as handsets, will eventually cover about 15 percent of Motorola's manufacturing needs in the unit that makes those devices.

Flextronics is based in Singapore, though managers including chief executive Michael Marks work out of San Jose.

The company will do the manufacturing at plants all over the world, including North America, Latin America, Europe and Asia.

Motorola wanted in April that second-quarter earnings would lag analyst forecasts on declining margins in its cell-phone business.

"The company said profit would be 87 cents per share, 1 cent lower than forecasts at the time from First Call/Thomson Financial. The current average forecast is 68 cents," Gray Benoit, vice president of Motorola's Communications Enterprise unit, said the company isn't changing its profit forecast because the agreement with Flextronics was already included in its most recent estimate.

"This certainly will be cost-effective," Benoit said. "It redirects resources that would be invested in expanding our capacity over to design and development of new products."

For Flextronics, the agreement adds to contracts that helped boost sales 79 percent to $5.74 billion in the year that ended in March, making it the fourth-largest contract manufacturer.

The company told analysts this year that it could as much as double sales from Cisco Systems Inc., the No. 1 maker of Internet equipment, and its biggest customer, in the year ending March 2001.

"It's been a very aggressive company," said Yuen May, an analyst at Kim Eng Securities Pte in Singapore. "It's now regarded as one of the top five contract manufacturers."

Flextronics, which has plants in several parts of the world, has been buying rival manufacturers in the past year and started building industrial parks in Hungary and Poland. It is also buying plants from Ericsson AB, the world's No. 3 cell-phone maker, Hewlett-Packard Co., the No. 2 computer maker, and Ascend Holding AG, Switzerland's largest telephone equipment-maker.

In September, Flextronics beat out Singapore's National Electronics Ltd., the world's No. 6 contract manufacturer, for the purchase of the Singapore plant of Compaq Computer Corp., the world's biggest PC maker.

AP Radio to Go Online

San Francisco startup AudioBasket plans to make radio reports from the Associated Press available through its Web-based audio content service. Using a computer or wireless device, AudioBasket customers receive daily customized broadcasts based on their interests.

The company also has content partnerships with the Wall Street Journal and the BBC.
Growth of CMs

- US Big 3 headquarters in Silicon Valley
- Taiwan & China rising
  - FoxConn > Flex + Solectron

**Top 10 Electronics Contract Manufacturers 2003**

<table>
<thead>
<tr>
<th>Company</th>
<th>Country</th>
<th>Revenue (bn US $)</th>
<th>Type of Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flextronics Int.</td>
<td>US</td>
<td>13,822</td>
<td>EMS</td>
</tr>
<tr>
<td>Solectron</td>
<td>US</td>
<td>11,144</td>
<td>EMS</td>
</tr>
<tr>
<td>Foxconn (Hon Hai)</td>
<td>TW</td>
<td>10,899</td>
<td>EMS/OEM</td>
</tr>
<tr>
<td>Sanmina SCI</td>
<td>US</td>
<td>10,795</td>
<td>EMS</td>
</tr>
<tr>
<td>Quanta</td>
<td>TW</td>
<td>8,576</td>
<td>ODM</td>
</tr>
<tr>
<td>Celestica</td>
<td>CDN</td>
<td>6,735</td>
<td>EMS</td>
</tr>
<tr>
<td>Asustek</td>
<td>TW</td>
<td>5,747</td>
<td>ODM/OBM</td>
</tr>
<tr>
<td>Jabil Circuit</td>
<td>US</td>
<td>5,170</td>
<td>EMS</td>
</tr>
<tr>
<td>Compal</td>
<td>TW</td>
<td>4,760</td>
<td>ODM</td>
</tr>
<tr>
<td>Mitac</td>
<td>TW</td>
<td>4,564</td>
<td>ODM</td>
</tr>
</tbody>
</table>

Source: Electronic Business 300, 8/1/2004
It’s Not All About China

- CMs put factories all over the world

Global Locations Foxconn Electronics, 2003

Source: Company Information www.foxconn.com

Institut für Sozialforschung – Projektgruppe Elektronikindustrie 2003
Geography: Flextronics International, 2000

Legend:
- Green: Product Introduction Centers
- Purple: Product Design Centers
- Red: Regional Manufacturing Operations
- Blue: Industrial Parks
- Orange: Enclosures
Internal Clusters

- Industrial Park Flextronics – Guadalajara, Mexico
Globalized Industry

I. Production
II. Distribution
III. Transport & Communications
II. Distribution

A. Defined
B. Middlemen
C. Warehouses
D. Linkages
What is Distribution?

- Movement of goods (transport)
- Storage & transfer (warehousing)
- Coordination (middlemen)
  - Managing the whole process
  - Communications

- Many terms: trade, linkage, circulation, logistics, etc.
Distribution is Huge

- Huge part of economy (GDP)
  - 21% in China, 16% in India, 11% in EU, 8% in USA
  - Importance of productivity growth (like manuf.)

  - Manufacturing: 14,330,000
  - Wholesale, transport & warehousing: 9,905,000
  - Retail: 15,035,000

- Key role in Economic Geography
  - Spatial integration of all the parts & places
II. Distribution

A. Defined
B. • Transport
C. Warehouses
D. Middlemen
Placing transportation

- Moving product
  - Between stages of production
    - Within production systems
  - To final markets
    - Final products to sale

- Huge sector of economy
  - Goods >> passengers
Cost of transport

- Crucial to all production & distribution
  - Central to all economic geography
    - Cf. Alfred Weber & classical location theory

- Types of costs
  - Distance
  - Time
  - Damage/loss
II. Distribution

A. Defined
B. Transport
C. •Warehouses
D. Middlemen
Warehouses

- **Storage**
  - Between factories & stores

- **Distribution Centers**
  - Receive & ship products

- **Transshipment**
  - Breakdown & repackage
  - Quality checks/ finishing

- **Major workplaces**
  - Labor force
  - Automation
Warehouse Geography

- Individual warehouses
  - Attached to factories
  - Regional distribution centers
- Warehouse clusters
  - Near transport hubs
  - In ‘industrial’ parks
Growing Scale

- Larger buildings
- More products
- Bigger service areas
- Moving outward
II. Distribution

A. Defined
B. Transport
C. Warehouses
D. • Middlemen
Middlemen

- Manage distribution systems
  - Many names, past & present
    - wholesalers, traders, merchants, brokers, logistics, intermediaries, etc.

- Many forms
  - Independent firms
    - Large & small
      - E.g. McKesson
  - Integrated firms
    - Linked to manufacture
      - E.g. Toyota
    - Linked to retail
      - E.g., Wal-Mart
Communications

- Information flow – key to management
- Tracking goods, interacting between sites
Globalized Industry

I. Production

II. Distribution

III. • Transport & Communications
III. Transport & Communications

A. • Networks
B. Hubs
C. Revolutions
Modes

- Transport
  - Ships
  - Railroads
  - Highways (trucks)
  - Airplanes
  - Pipelines

- Communications
  - Mail
  - Telegraph
  - Telephone
  - Internet
  - Face-to-face
Networks

- Traffic pathways
  - Geographically concentrated
  - No network reaches everywhere....
  - Affects cost & speed, hence location of industry
Knitting Up Networks

- Failure of EU linkages for goods
- Led to decline rail transport (vs trucks) despite best rail system in world
III. Transport

A. Networks
B. Hubs
C. Revolutions
Transport Nodes

- Where networks end & merge
  - Ports, airports, railyards
  - Highway interchanges
- Junctions
  - 'Transshipment' points
    - Intermodal transfer
- Very lumpy geography
  - Key to urban agglomeration
Communications Nodes

- **Types**
  - Mail transfer stations
  - Telephone switching station
  - Microwave junctions
  - Internet server farms

- **Geographies**
  - Urban networks & nodes
  - The internet is lumpy, too
  - Face-to-face commun’s
    - Cities & industrial districts
Transport Hubs

- Major junctions & transfer points
  - Old port cities
  - Old railroad cities
  - Today’s port-rail-highway hubs
  - Airport cities
Chicago & San Francisco

- Chicago – hub of Midwest
  - #1 in RR traffic
  - Link to Great Lakes

- SF – hub of Pacific
  - #1 port < 1950
  - Southern Pacific RR
Keeping on Top

- **Chicago**
  - 1860s
    - Short line -- Inter-RR transfer
    - Stockyards – biggest meatpacking district
  - 1990s - CREATE project
    - 6 RRs and DOTs
    - Flyovers, grade separations, corridors

- **SF**
  - 1900s innovations
    - Beltway RR
    - Rebuilt docks
  - 1960s failure
    - Oakland takes containers
L.A.- West Coast Hub

- Port to rail & highways
  - $2.5B in annual traffic
  - Links Asia to eastern US
Alameda Corridor Project

- Massive infrastructure program (1990s)
  - $2B investment (public)
  - Double tracks, below grade
    - Eliminate 200 street crossings
  - Connect port to downtown rail terminals
The Inland Empire

- Transport corridor
  - RR & highways
- Warehouse center
  - 200 M sq feet
- Seeking major upgrade
  - (like Alameda Corridor)
III. Transport & Communications

A. Networks
B. Hubs
C. • Revolutions
T& C Revolutions

- Faster, cheaper, smoother
  - Space-time compression
- Canal & river, 1820s
  - Mail service
- Railroad, 1850s
  - Telegraph
- Trucks, 1910s
  - Telephone
- Air Freight, 1950s
  - Jets & intern’l phones
- Logistics, 1990s
  - Internet
T&C Revolutions II

- Transform geography of industry
  - G. Fields, *Territories of Profit*

- T&C vs. Industrial Revolutions
  - Is T&C causal? (does Fields say that?)
  - Links between T&C and IR
    - The need:
      - More product, greater DOL, more widespread industry
    - The means:
      - New machinery, new electronics, more capital to invest
Case: Container Revolution

- Container invented c 1955
  - By NY trucking magnate
- Dominates shipping today

Advantage of Containers

- Pack at factory/warehouse
- Simpler intermodal transfer
- Security & damage control
Revolution in Ports

- Old ports close/new ports open
  - Usually farther away from cities
- Old warehouse districts close
  - Rise of dispersed warehouses
Revolution in Ships

- Ever larger ships
- Deeper ports
- Built in Korea & Japan
Back to Globalization

- **Means**
  - Containers, ships, ports
  - International flights
  - Internet
  - *Logistics revolution (Next lecture)*
  - Global corporations

- **Needs**
  - Expansion of industry & output
  - Newly industrialized countries
  - Growing international trade
  - Growth of DOL & prod’n systems
  - More outsourcing