Lecture 9

Globalized Production
I. • Production
II. Distribution
III. Transport
I. Production

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

- Triple meaning
  - Growing industry in new places
    - Lectures 2 & 3
  - Global inputs
    - Resources (Lectures 20-24)
  - Global production systems
    - Global division of labor (today)

- How large? Lack of data
Production at many sites around the world in one industry
Global re-sourcing
Global production systems

- Products manufactured in many places around the world

<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>
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<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</td>
</tr>
<tr>
<td>3.5&quot; Floppy Disk Drive</td>
<td>Philippines</td>
</tr>
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<td>Modem Card</td>
<td>Netherlands (chips from USA, Korea, Taiwan)</td>
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<tr>
<td>Graphics Card</td>
<td>China (chips from USA, Korea, Taiwan)</td>
</tr>
<tr>
<td>Specialist Video Card</td>
<td>USA</td>
</tr>
<tr>
<td>Monitor</td>
<td>UK (origin of components?)</td>
</tr>
<tr>
<td>Keyboard</td>
<td>Mexico</td>
</tr>
<tr>
<td>Mouse</td>
<td>Mexico</td>
</tr>
<tr>
<td>Child's Mouse</td>
<td>Taiwan</td>
</tr>
<tr>
<td>L oudspeakers</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Microphone</td>
<td>Mexico</td>
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<tr>
<td>Inkjet Printer</td>
<td>Spain</td>
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<tr>
<td>Zip Drive</td>
<td>Malaysia</td>
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<tr>
<td>Scanner</td>
<td>Taiwan</td>
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<tr>
<td>Webcam</td>
<td>China</td>
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<td>Power Supplies (Peripherals)</td>
<td>Taiwan, China, Malaysia, Mexico</td>
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<td>Manuals</td>
<td>Scotland, Ireland, Wales, Germany</td>
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<td>Environmental Certification</td>
<td>Sweden</td>
</tr>
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Global shifts

- Sector after sector...
  - Whole products
  - Resources
  - Parts of products

For reasons of both competition & cost

- 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 2 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
Beyond one product, one factory

- Production systems
  - Multi-step manufacturing
  - Component-assembly systems
- Beyond the factory
  - Production at multiple sites
- Confusing terminology
  - systems = chains = networks
Multi-location geography

- Multiple sites to make a single product
  - From location to spatial pattern
  - Almost no maps!

- Node & network geographies
  - Specialized sites
  - Clusters & districts
  - Linkages & flows
    - (transport & communication)

- Global geographies, but…
  - National multi-site patterns
  - Multi-site within clusters/districts
I. Production

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

- Shifting parts of production systems overseas
  - Vs. Normal trade
    - Mostly final products
    - Open market, foreign firms
  - Strong in recent years
    - Led by electronics
- 3 forms
  - Intra-firm (2/3ds)
    - Build factories abroad
  - Subcontracting
    - Long-term agreements
  - Contract manufacture

Source: Bardhan, Jaffee and Kroll
Subcontracting

- Going outside the firm
  - “Outsourcing”
- Vs. Open Market
  - ‘Off the shelf’ (open market)
  - ‘Subcontracting’ (ongoing relation)
- Formal & informal
  - Legal vs. personal (trust)
    - Line is often fuzzy
- Lead firms – OEMs
  - Subcontracting networks
  - Multi-level
Logic of subcontracting

- Efficiency
  - ‘Buy or make’?
  - Economies of scope
    - *Ronald Coase, Harold Williamson*
- Quantity & risk
  - Rapid expansion & contraction of supply
- Labor cost & control
  - Lower wage supplier (may be geographic)
  - Escape labor contracts, obligations
I. Production

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

- Beyond inputs & components
  - Subassemblies
  - Whole products

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

A) Vertical Integration

Traditional Manufacturing Firm

- Product strategy
- Product
- Process R&D
- Functional design
- Form design

Prototype fabrication
- Parts purchasing
- Manufacturing
- Testing
- Packaging

Admin.

Market Channel

Sales Reps.
System Int.

End User

Firm boundary

B) Value Chain Modularity

Brand Name Firm

- Product strategy
- Product R&D
- Functional design
- Form design
- Prototype fabrication

Marketing

Admin.

Contract Manufacturer

- Process R&D
- Design for mfg.
- Parts purchasing
- Manufacturing
- Testing
- Packaging

Marketing

Admin.

Sales Reps.
System Int.

End User

Codifiable transfer of specifications (CAE, CAD, CAM, EDI, SCM) at the inter-firm link.
New division of labor

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

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

Motorola to Send $30 Billion Worth Of Manufacturing to Flextronics

Global Business News

SCHUSSHEIM, Ill. — 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 $93.75.

With cell phone sales forecast to surge by almost two-thirds to 600 million this year, Motorola wants to secure the manufacturing it needs to compete with No. 1 Nokia Oy. 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 Metris Asset Advisors Inc., which owns more than 75,000 Motorola shares. The agreement, which includes the production of cases and television set-top boxes used to access the Internet, 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 warned in April that second-quarter earnings would lag analyst forecasts on declining margins in its cell-phone business.

The company said profit would be 67 cents per share, 3 cents 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 have been invested in expanding our capacity over to design and development of new products." For Flextronics, the agreement adds to contracts that helped boost sales 76 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 absorb as much as $3 billion worth of new sales from companies like Motorola, which is buying rival manufacturers in the past year and started building industrial plants 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 Ascom 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 Audibasket plans to make radio reports from the Associated Press available through its Web-based audio content service. Using a computer or wireless device, Audibasket customers receive daily customized broadcasts based on their interests. The company also has content partnerships with the Wall Street Journal and the BBC.

CHRONICLE STAFF
Growth of CMs

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

<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 International</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>
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<tr>
<td>Foxconn (Hon Hai)</td>
<td>TW</td>
<td>10,899</td>
<td>EMS/OEM</td>
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<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>
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<tr>
<td>Celestica</td>
<td>CDN</td>
<td>6,735</td>
<td>EMS</td>
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<tr>
<td>Asustek</td>
<td>TW</td>
<td>5,747</td>
<td>ODM/OBM</td>
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<tr>
<td>Jabil Circuit</td>
<td>US</td>
<td>5,170</td>
<td>EMS</td>
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<tr>
<td>Compal</td>
<td>TW</td>
<td>4,760</td>
<td>ODM</td>
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<tr>
<td>Mitac</td>
<td>TW</td>
<td>4,564</td>
<td>ODM</td>
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</tbody>
</table>

Source: Electronic Business 300, 8/1/2004
Global Locations Foxconn Electronics, 2003

Source: Company Information [www.foxconn.com](http://www.foxconn.com)

Institut für Sozialforschung – Projektgruppe Elektronikindustrie 2003
I. Production
II. •Distribution
III. Transport
II. Distribution

A. Movement
B. Wholesaling
C. Warehousing
D. Transport
Distribution defined

- Moving product
  - Between stages of production
  - To final markets

- Collect & coordinate
  - Beyond simple movement & transport

- Geographical integration of production
  - Essential role economic geography
  - ‘Linkage’, ‘circulation’, etc.
Major sector of economy

- Often overlooked
  - compared to manufacture & retail

  - Manufacturing: 14,330,000
  - Wholesale trade: 5,655,000
  - Transportation & warehousing: 4,250,000
  - Retail: 15,035,000
II. Distribution

A. Movement
B. *Wholesaling*
C. Warehousing
D. Transport
Wholesalers

- Intermediaries
  - ‘traders’, ‘merchants’
  - Manage trade & distribution
- Types of firms
  - Independent
    - Large & small
  - Integrated
    - Linked to manufacture
      - (e.g., Toyota)
    - Linked to retail
      - (e.g., Wal-Mart)
II. Distribution

A. Movement
B. Wholesaling
C. • Warehousing
D. Transport
Warehouses

- Sites of storage & transfer
  - Between factories & stores
  - Receive & ship products

- Major workplaces
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. Movement
B. Wholesaling
C. Warehousing
D. • Transport
Placing transportation

- Moving product
  - From production to sale
  - Inside production

- Much bigger than passenger flow
Linkage & flow

• Transport links
  ▪ Knit together factories, warehouses & stores

• Transport flow
  ▪ Movement of materials, parts, equipment, finished goods
Cost of transport

• Crucial to all production & distribution
  - Central to all economic geography

• Types of costs
  - Distance
  - Time
  - Damage/loss
Huge economic sector

- Note the division of ‘in-house’ and ‘for hire’ (subcontracting)
Globalized Industry

I. Production
II. Distribution
III. •Transport
III. Transport Revolutions

A. Modes & Nodes
B. Hubs
C. Transport Revolutions
D. Container Revolution
Transport modes

- Ships
- Trains
- Trucks
- Aircraft
- Pipes

- Ports
- Railroads
- Highways
- Airports
- Pipelines
Geography of transport networks

Legend:
- Blue = Interstate Pipeline
- Dark Gray = Intrastate Pipeline
- Red = Compressor Station
Nodes

- **Endpoints**
  - Ports, airports, railyards
  - (Highways & pipelines less nodal)

- **Junctions**
  - Where networks merge
  - ‘Transshipment’ points
Intermodal connections

Old SF Belt RR

Port of LA today
Linking up transport networks

- Failure of EU linkages for goods (cf people!)

- Led to decline rail transport (vs trucks) despite best rail system in world
III. Transport

A. Modes & Nodes
B. •Hubs
C. Transport Revolutions
D. Containers
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
Innovation & leadership

- 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 today

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

- 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
- Warehouse center
- Seeking major upgrade
  - (like Alameda Corridor)
III. Transport

A. Modes & Nodes

B. Hubs

C. Transport Revolutions

D. Containers
Transport revolutions

- Canal & river, 1820s
- Railroad, 1850s
- Trucks, 1910s
- Air Freight, 1950s

Transform geography
III. Transport

A. Modes & Nodes
B. Hubs
C. Transport Revolutions
D. •Containers
Container revolution

• Container invented c 1955
  • By NY trucking magnate

• Dominate shipping today

Advantage of containers

- Pack at factory/warehouse
- Simpler intermodal transfer
- Security & damage control
New geography of ports

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

- Ever larger ships
- Deeper ports
- Built in Korea & Japan
Means of Globalization

- Containers essential
- Global shipping corps.
  - New breed
- Shift to Pacific Basin
  - Growth of LA port

<table>
<thead>
<tr>
<th>Rank</th>
<th>Operator</th>
<th>TEU Capacity</th>
<th>Market Share</th>
<th>Ships</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>APM-Maersk</td>
<td>2,031,886</td>
<td>15.50%</td>
<td>539</td>
<td>8.91%</td>
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<tr>
<td>2</td>
<td>Mediterranean Shg Co</td>
<td>1,469,865</td>
<td>11.20%</td>
<td>425</td>
<td>7.03%</td>
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<td>3</td>
<td>CMA CGM Group</td>
<td>988,141</td>
<td>7.50%</td>
<td>378</td>
<td>6.25%</td>
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<td>4</td>
<td>Evergreen Line</td>
<td>624,536</td>
<td>4.80%</td>
<td>176</td>
<td>2.91%</td>
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<tr>
<td>5</td>
<td>Hanjin-Lloyd</td>
<td>488,135</td>
<td>3.70%</td>
<td>128</td>
<td>2.12%</td>
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<td>6</td>
<td>COSCO Container L.</td>
<td>485,796</td>
<td>3.70%</td>
<td>148</td>
<td>2.45%</td>
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<td>7</td>
<td>APL</td>
<td>473,170</td>
<td>3.60%</td>
<td>131</td>
<td>2.17%</td>
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<td>8</td>
<td>CSCL</td>
<td>450,928</td>
<td>3.40%</td>
<td>143</td>
<td>2.36%</td>
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<tr>
<td>9</td>
<td>NYK</td>
<td>433,000</td>
<td>3.30%</td>
<td>119</td>
<td>1.97%</td>
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<tr>
<td>10</td>
<td>Hanjin / Senator</td>
<td>378,282</td>
<td>2.90%</td>
<td>91</td>
<td>1.50%</td>
</tr>
</tbody>
</table>

World Fleet TEU Capacity: 13,108,859