Lecture 11

Crossing Space: Flow & Logistics
Flow & Logistics

I. Production Flow

II. Distribution Flow

III. Systems Revolutions
I. Production Flow

A. Flow & Stock
B. Tracking
C. Quality Control
D. External Supply
E. Demand Pull
Flow

- Movement of material/product
  - Between stages of production

- Geography of flow
  - Within factory
  - From supplier to factory
  - From factory to customer

- Linkage
  - Trucks, carts, forklifts, moving lines, pipes, etc
Stock

- Breaks in flow
  - Buffer stocks

- Stock maintains flow
  - (ironically)

- Cost of stock
  - Quantity x time
Stock, Flow & Efficiency

- Labor time & flow
  - Materials must arrive as needed
  - Minimizing labor time (max. productivity)

- Capital cost & stock
  - Money tied up in unused, unsold stuff
  - Minimizing turnover time (rate of profit)

- Time management
  - Maximize flow, minimize stock
  - Ideal of ‘continuous flow’
I. Production Flow

A. Flow & Stock
B. Tracking
C. Quality Control
D. External Supply
E. Demand Pull
Keeping track of flow

- Quantity (control)
  - How much flow in and out
  - Location in system

- Tracking systems
  - Monitoring & feedback
  - Manual & automatic
Tracking stock

- Measuring stocks
  - ‘Taking inventory’

- Maintaining stocks
  - Restocking

- Coordination
  - Shopfloor & stockroom
  - Store shelves & storeroom
How things have changed...
Beyond bar-codes...

Benetton to keep track of clothing with tiny transmitter

By Jenny Strasburg and Matthew Yi
Chronicle Staff Writers

Microchip transmitters, no larger than a grain of salt, soon will be attached to pieces of clothing in 5,000 Benetton stores—a technological leap the Italian retailer said will help it track pants and sweaters from factory to sales floor to cash register.

Benetton said Tuesday that the microchips will be embedded in the labels of its high-end Sisley clothing in all of its stores, including about 140 U.S. locations.

The chips—made by Philips Semiconductors and fitted with microscopic antennas by an Italian technology startup called LabID—will emit radio waves to a range of 5 feet. The companies said the radio signals will be picked up by sensors in each Benetton store.

The idea is for Benetton to know exactly what’s sitting on its store shelves or in its warehouses and coming from offshore factories at all times. That knowledge—cherished by retailers in a highly competitive business—could save it money by boosting the accuracy of its orders and getting deliveries to stores more quickly.

Retail experts said the frequency identification (RFID) chips are based on technology that has existed at least a couple of years. They have been used on a limited basis by retailers ranging from Wal-Mart to San Francisco’s Gap.

The chips have yet to be widely adopted in part because of cost. They range from 10 cents to $1 each, depending on how much memory they hold, said Rusty Jones, a retail analyst at Cap Gemini Ernst & Young.

“Obviously that means that only feasible for items that...”

They’re using chips on dogs, children -- are you next?
Fully automated systems

Supply Chain Solution Provider Introduces a System That Tracks the Quantity of Automotive Parts on the Assembly Line and Reorders When Stocks Are Low

WhereNet has combined its RFID-enabled real-time locating system and wireless local area network (LAN) technology with sensors and software from Visible Inventory, a Salem, N.H.-provider of inventory-management technology, to create WhereSoft, an automated parts-replenishment system for the automotive industry. Previous renditions of WhereNet's parts-replenishment products required human intervention to push a button. That alerted the system that specific materials and parts had been used. Now, by taking advantage of sensor technology from Visible Inventory, the system automatically senses when parts are taken from a storage container, alerts the system and triggers an order to an automotive parts supplier to replenish inventory as needed. In addition, the system can also be configured to alert factory workers to deliver more parts to a specified area.
I. Production Flow

A. Flow & Stock
B. Tracking
C. Quality Control
D. External Supply
E. Demand Pull
The Cost of Quality

- What does quality cost?
  - Sales (poor quality does not sell)
  - Repairs (e.g. car recalls)
  - Wasted materials & labor

- From ‘workmanship’ to ‘quality control’
  - From labor skill to managerial problem

- Evolution in management
  - From ‘time management’ (Taylorism) to ‘quality management’
Quality Control

- Testing
- Standards
- Rejects
Computerized Quality Control

- Within factory
  - Sensors
  - Rejection
  - Replacement

- Among factories
  - Recorded & transmitted
  - Monitored by management

- Cisco Systems
  - Test machinery in all factories worldwide (subcontractors)
  - Linked to HQ
I. Production Flow

A. Flow & Stock
B. Tracking
C. Quality Control
D. •External Supply
E. Demand Pull
Forms of External Supply

- Intra-firm
  - Between divisions/factories
- Open market
  - Spot
- Contractual
  - Product specifications (specs)
- Managed inter-firm
  - Oversight & process specs
Timing & Coordination

- Ad hoc (spot market)
  - Buy as needed
- Just-in-case (contractual)
  - Buy in advance & stock up
- Just-in-time (managed)
  - Delivered only as needed
  - Little stock (‘Lean Production’)
- Automatic (computerized)
  - Automatic reorders
  - Internet (interactive) orders
I. Production Flow

A. Flow & Stock
B. Tracking
C. Quality Control
D. External Supply
E. •Demand Pull
Meeting Demand

- The point of production
  - Is not only at the ‘point of production’
  - Products must find buyers

- Producers must link to buyers
  - Right product
  - Right place
  - Right time
  - Work right (quality)
Linking Demand & Supply

- Take orders
  - Choice/ specification
  - Communicate to factory
  - Rapid response (fulfillment)
  - Quick delivery

- Pull-through production
  - The ideal: individual choice, seamless flow
  - The reality: anticipation & correction
Quick Response Systems

- **Goals**
  - Speed up order fulfillment
  - React quickly to changes in consumer taste

- **Means**
  - Tracking by barcodes
    - At point of sale, stockrooms, on containers, etc.
  - Electronic transfer & storage
  - Computerized management of stock & flows
Flow & Logistics

I. Production Flow

II. Distribution Flow

III. Systems Revolutions
II. Distribution Flow

A. • Logistics
B. New Logistics
What is Logistics?

- New name for distribution
  - Transport
  - Storage

- Close handling of stock & flow
  - Quantity & quality (damage)
  - Time & place

- Management of supply chains
  - Linking production & distribution
The New Logistics

- Integration of complete supply chains
  - Coordination of production & distribution

- A revolution in management
  - Closer attention to time & space economies

- Globalized supply chains
  - Across borders & oceans
Why the New Logistics?

- Greater output, great flow
  - Ever-rising industrial productivity
- Greater distances
  - Global industrialization
  - Long-distance production systems/chains
- Greater attention
  - More global competition
  - Management revolution
- Greater capacity
  - IT revolution
  - "Virtual integration" - Fields
II. Distribution Flow

A. Logistics
B. •New Logistics
Logistics Leaders

- New industry structure
  - Shippers
  - Port authorities
  - Manufacturers
  - Retailers

- New efficiency
  - Falling share of distribution (USA)
    - 14.5% of GDP in 1982
    - 8% of GDP in 2006
Shippers & New Logistics

- Truck (UPS, FedEx, TCI India)
- Air (FedEx, DHL, UPS)
- Ocean (SeaLand, Merck, Evergreen)
- Rail (REA)
- Pipeline (El Paso Gas)
A Simple Scheme

How it was: The linked supply chain

Independent Companies handled each phase of the cargo-handling process

How it is: Integrated supply chain

Common ownership / One company controls all or many phases.
UPS

- Transport
  - 90,000 trucks
  - 270 aircraft

- Nodes
  - Louisville package center
    - 300,000/hour
    - 17,000 conveyor belts

- Communications/IT
  - 50X computing NYSE
UPS Goes Global

- Managing global supply chains
- “Synchronizing the world of commerce”
New firms

- **Our Mission.** To Be The No. 1 Supply Chain Solutions Player in Asia Pacific
- **Our Vision** To Build THE Logistics Superhighway in a Borderless World.
- **Our Passion** To create the ultimate superhighway of optimal efficiency & speed.
- THE Logistics Superhighway will enable the Physical, Informational, and Financial flows of the supply chain to flow seamlessly throughout a borderless world.
American President Lines

NOL (Neptune Orient Lines)
Headquarters: Singapore
Employees: 12,000 worldwide

APL Logistics
4,000 employees,
300 offices in 53 countries;

Regional Headquarters: 1111 Broadway,
Oakland, CA
8 U.S. offices include
local offices: 614 Terminal Way
Terminal Island, CA;
959 South Coast Drive, Suite 225
Costa Mesa, CA

International Intermodal eXpress (IIX)

NVOCC
4281 Katella Avenue
Los Alamitos, CA
Wholly-owned by APL Logistics

Imperial CFS Inc.
Contracted CFS
1331 West Torrance Blvd.
Torrance, CA

* Member of the New World Alliance with Hyundai
Merchant Marine and Mitsui O.S.K.
K-Line (Kawasaki, Kisen, Kaisha Ltd.)
Headquarters: Tokyo
111 Operations in 25 Countries

K-Line Ltd., (Shipping Agency)
Tokyo

K-Line America, Inc.
PMA Signatory
North American Headquarters:
Richmond, VA
23 U.S. offices include local offices:
Huntington Beach, CA;
Pleasant Hill, CA;

K-Line Total Logistics

K-Line Air Service Ltd./
Horizon Intermodal
NVOCC
Headquarters: Hong Kong
Local office: El Segundo, CA

St. George Warehouse
Contracted CFS
7 U.S. facilities include:
Rancho Dominguez, CA

Universal Warehouse Co.
Carson, CA

CENTURY DISTRIBUTION SYSTEMS,
INC.
Headquarters: S. Plainfield, NJ;
Local Office: Carson, CA;
Moraga, CA

K-LINE SHIP
MANAGEMENT,
CO., LTD.

Accounting and Finance

ITS Terminal, Long Beach
Transbay Container Terminal, Oakland
Husky Container Terminal, Tacoma

PMA Signatory

CFS

NVOCC

ULS EXPRESS
(trucking company)
Carson, CA
Manufacturer Logistics

- In-house capital
  - Transport fleets
  - Warehouses

- In-house managers
  - Offices near major hubs

- Samsung, Toyota, etc.
Retailer Logistics

- Dell, Wal-Mart, Macy’s, etc.
Port authority players

- Contract to coordinate flows
- Not just passive leasing of space
Flow & Logistics

I. Production Flow
II. Distribution Flow
III. • Systems Revolutions
Revolutions Defined

- Reorganizing whole systems
  - Production + Distribution
  - Integration & coordination
  - Management breakthroughs
  - T&C revolutions

- Not new!
  - Ongoing part of industrial revolution
III. Systems Revolutions

A. Swift
B. Ford
C. A&P
D. Toyota
E. Dell
Swift & Co - Here's the Beef
Swift’s Achievements

- New meatpacking system
  - In Chicago, hub of beef production
- Railroads
  - Linking Chicago to New York
  - Refrigerated cars
- Warehouses & distribution
  - Wholesaler to eastern markets
- Putting it all together
  - Telegraph
  - Business organization
    - Gary Fields, Territories of Profit
Swift Geography

- Concentration of meatpacking in Chicago
- Linking of East & Midwest
- Chicago’s dominance over plains (cattle)
III. Systems Revolutions

A. Swift
B. •Ford
C. A&P
D. Toyota
E. Dell
Mass Production Revolution

- Giant step ahead in manufacture
- Reorganizing the factory
  - More than the assembly line
  - A new product
What Ford Achieved

- Standardization
  - Of parts & product (Model T)
  - Just-in-case stocks
- Taylorism
  - Break down labor process into component parts
  - Time study
- Mechanization
  - Of simple actions
- Linear sequencing
  - Workers & machines
- Moving assembly line
  - Only after other steps

R. Hounshell, *From the American System to Mass Production*
Fordist Geography

- Growth of Detroit
  - Greatest automobile cluster/district
  - Fastest growing US city, 1900-1930
III. Systems Revolutions

A. Swift
B. Ford
C. A&P
D. Toyota
E. Dell
A&P - Revolution in Retail
What A&P Achieved

- Chain stores
  - Formula/standard stores
  - Self-service & check-out
- Distribution
  - Integrating retailing and warehousing
- Bulk purchase
  - Integrating suppliers
  - Processed food
    - Richard Tedlow, *New and Improved: The Story of Mass Marketing in America*
A&P Geography

- Dispersed retail

- (No maps of wholesale system)
III. Systems Revolutions

A. Swift
B. Ford
C. A&P
D. •Toyota
E. Dell
Rethinking Mass Production

- **Just-in-time**
  - Low inventory
  - Pull-through (Kanban)

- **Quality control**
  - Mistakes corrected
  - No lemons, no waste

- **Work groups**
  - Worker cooperation
  - Worker suggestions

- **Keiretsu**
  - External suppliers
  - Close ties & controls

- **More than ‘lean production’**
What Toyota Achieved

- Postwar rebuilding of Japan
  - Improving on American Fordism
    - Letting new people innovate (Ohno)
  - Making virtue of necessity
    - Low capital, space, output

- Beyond Fordism
  - Better flow, less stock
  - Better inter-firm coordination
  - Better quality control
  - Better use of labor
Toyota’s Geography
Nagoya & Toyota City

Car capital of Japan

Once a silk-weaving hub, Toyota City is now one of the largest automobile manufacturing centers in the world.

- Former name
  Koromo (changed in 1959)
- Population
  420,000, including 16,800 foreigners
- Work force
  80 percent of workers are in the auto industry
- History
  Before the Great Depression, Koromo was a silk production hub; the 1929 crash destroyed the industry, so a loom maker named Kiichiro Toyoda began making automobiles

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Graphic: Los Angeles Times
Spread of Japanese System

- Japanese exports, 1970s
- Transplants to US & EU, 1980s
- Imitation
  - Adopted by US & EU firms, 1990s
- Implanted in East Asia, 1990s
  - Thailand, Guangdong
III. Systems Revolutions

A. Swift
B. Ford
C. A&P
D. Toyota
E. Dell
Revolution in Retailing

- Demand pull
  - Tracking purchases
- Rapid response
  - Restocking popular items
- Relay down the supply chain
  - Reorder & response
- Fashion change
  - Faster shifts
Dell’s Big Deal - management via the internet

- Merchant-manufacturer
  - Some assembly, no parts, no stores, no transport
  - Everything is subcontracted
- Internet sales
  - Website orders
  - Ship by UPS, FedEx, etc.
- Build-to-Order (pull through)
  - Computer accounts
  - Projection & preparation
- Internet supply links
  - Orders transmitted by website
  - Coordination by website
New Retail Geography
Global Geography of Retail

- Global sourcing
  - Expansion of Asian market

- US trade imbalance
  - Hollowing US manufacture

- Trans-Pacific trade
  - Global logistics
Which segues into ...

- Lecture 12: Retailing

- Stay tuned for our next exciting episode...