

What is this course about?

- Production and operations strategy
 - decisions related to production, storage, distribution of goods and services
- Business strategy
 - selecting market(s) to compete
 - level of investment
 - allocation of resources
 - functional area strategy
 - marketing
 - finance
 - production and operations



Operations decisions

- Strategic - long term, high capital investment
 - number, size and location of new plants, distribution centers and warehouses
 - design of transportation facilities, communications equipment, data processing means, etc.
- Tactical - medium term
 - Work-force size, Inventory policies, selection of transportation alternatives
- Operational (Functional) - short term
 - production scheduling
 - vehicle routing and scheduling

Why need operations management?

PRESSURES FROM TODAY'S COMPETITIVE ENVIRONMENT

- Rapidly changing demand and market conditions
 - Diversity of customer requirements in global markets
 - Demands for mass customization/Product variety
 - Short product life cycles

Why need operations management?

- **Compaq** computer estimates it lost \$500 million to \$1 billion in sales in 1995 because its laptops and desktops were not available when and where customers were ready to buy them.
- In 1993, **IBM** lost a major fraction of its potential sales of desktop computers because it could not purchase enough chips that control the computer displays.
- "**IBM** continues to struggle with shortages in the Think Pad line". (WSJ, May 1994)
- **Boeing Aircraft**, one of America's leading capital goods producers, was forced to announce writedowns of \$2.6 billion in October 1997. The reason? "Raw material shortages, internal and supplier parts shortages...". (Wall Street Journal, Oct. 23, 1997)

Why need operations management?

PRESSURES FROM TODAY'S COMPETITIVE ENVIRONMENT

- Rapidly changing market and demand conditions
 - Need flexibility and shorter time-to-market
 - Short Innovation/Product Development Cycles
 - Inventory becomes a major risk

Why need operations management?

- "**Dell Computers** predicts a loss; stock plunges. Dell acknowledged that the company was sharply off in its forecast of demand, resulting in inventory writedowns". (WSJ, August 1993)
- "**Liz Claiborne** said its unexpected earnings decline is the consequence of higher than anticipated excess inventories". (WSJ, August 1993)
- "When **Palm** formally reported its quarterly numbers in June, the damage was gruesome. Its loss totaled \$392 million, a big chunk of which was attributable to writing down excess inventory - piles of unsold devices." (*The Industry Standard*, June 16, 2001)
- During the decade from the mid-'80s to the mid-'90s, **IBM** and **Digital** lost \$80 billion in market value while new, specialized business designs (by **Intel**, **Microsoft**, and others) gained \$80 billion, (from the book *Value Migration* by Slywotzk)

Why need operations management?

- **Nortel** posts \$19.2 billion loss for the second quarter.
 - Inventory write-downs of \$15.2 billion.
 - Lays off 20,000 employees.
- Nortel CEO John Roth: "It was only in October that customers stopped beating me up for not shipping fast enough, and now they say, 'Ship what? I don't need it.'" (June 2001, *The Industry Standard*)

Why need operations management?

- **Apple Computer** has reported a record \$740 million second quarter loss in 1997
 - huge writedowns of inventories, which climbed nearly \$2 million
 - increased outsourcing of various operational functions
 - liquidation of certain assets
 - reductions in total headcount; 2,800 jobs over the next 12 months
- "Almost every single smart e-tailer is moving to stock more and more." Julie Wainwright, CEO of pet-supplies site **Pets.com** (11/1999) In November 2000, Pets.com announced it was closing
- **Amazon.com**
 - ~100 million items in stock, \$2.76 billion in sales in 2000
 - Inventory turnover rate: 17 or 18 times a year; compared to 6 to 8 times in a bricks-and-mortar store

Why need operations management?

PRESSURES FROM TODAY'S COMPETITIVE ENVIRONMENT

- Rapidly changing market and demand conditions
- Increased competition
 - Focus on core competency
 - Outsourcing
 - Virtual integration

Why need operations management?

- **Xerox** announced that it will exit the small office/home office (SOHO) business segment. The decision was necessary for Xerox to focus on its core office and production printing segments, which the company sees as higher-growth opportunities (June 2001)
- **Boeing** now promotes itself as a company with a "core competency" not as an airplane builder, but as an integrator of complex electronics and IT-intensive systems. Plane-making has the inherently slower growth of any mature manufacturing business, which is why Boeing is outsourcing more and more metal-bending work and pushing what it calls "new frontier" opportunities, most of them in the company's high-tech Space and Communications unit, which includes major IT-intensive projects. (April 20, 2001)

Outsourcing

- Manufacturing
- Fulfillment
- Distribution

Outsourcing manufacturing - Computing and electronics industry

- Original equipment manufacturers (OEMs) outsource production and logistics to electronic manufacturing services (EMS) providers like Sollectron, Flextronics, and Celestica.
 - Flextronics' clients include **Cisco Systems**, **Microsoft**, **Handspring** and **Nokia**, and made contract to be the exclusive manufacturer of mobile handsets for **Ericsson**, the world's No. 3 mobile phone maker (February 2001)
- Speed and scale
- Improved asset utilization and low cost production
- Access to global markets
- Supply chain coordination and logistics services
- About 20% of electronics OEMs outsource manufacturing
- Capacity exchanges

Outsourcing at Cisco

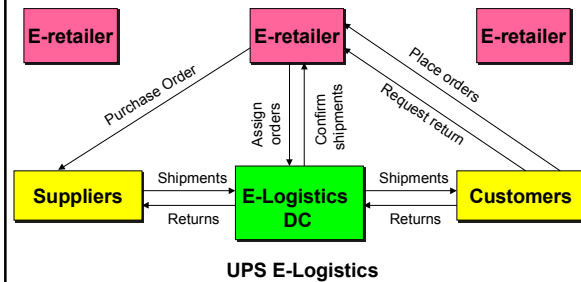
- Outsourcing manufacturing
 - outsource most production to contract manufacturers that operate 37 factories, all linked via the Net
 - suppliers make all the components, perform 90% of the subassembly work and do 55% of the final assembly
 - testing automated on supplier line with Cisco methodology
 - scheduling performed by supplier on actual demand signal
- Outsourcing distribution to Fedex
 - Merge-in-transit
 - Up to 100 shippers/merge
 - Plan shipments and manage customs
 - Tracking, coordination



Outsourcing at Cisco

- Supply management
 - suppliers monitor and replenish inventory, using actual demand info
 - integrate suppliers on new product development
- Demand management
 - single forecast for supply chain
 - build requirements transmitted daily
- Customer management
 - 70+% of orders handled through the web (order placement, configuration, pricing, status, lead times)
 - decentralized shipment, coordinated delivery
 - large customers tie their inventory and procurement systems to Cisco's systems
- Benefits of integrated supply chain
 - \$70 million annual savings, 25% faster time to market
 - increased investment in R&D

Outsourcing fulfillment



eToys - Fulfillment operations

- Stage I: In-house fulfillment
 - 80,000 sq. ft. low-tech warehouse in CA
 - 75% of orders come from east coast
 - Major fulfillment problems during holiday season 1998
- Stage II: Outsourcing (1999)
 - Warehouse and distribution agreement with Fingerhut Business Services
 - Access to one million sq. ft. facility in Utah, highly automated
 - Additional value-added services
 - Other Fingerhut customers: Wal-Mart, Levi Strauss & Co., Intuit Inc., PC Flowers and Gifts etc.



eToys - Fulfillment operations

- Stage III: In-house (again!)
 - Delivered 96% of merchandise on time during 1999 holiday season
 - Higher than expected order fulfillment costs
 - \$62 million in inventory
 - 400,000 sq. ft. warehouse in Danville, Virginia
- Stage IV: Closing doors
 - Filed for bankruptcy in March 2001



Outsourcing logistics to 3PLs- Apple supplier hubs managed by Fritz Companies

- Apple Computer plants in California and Colorado
- Suppliers in Asia
 - long lead times
- Supply chain between Apple and Asian suppliers
 - ocean freight processing
 - customs clearance
 - long-haul transportation
 - warehousing
 - local transportation
- In the mid 1990s, build a "supplier hub" at each plant, shared warehouse for the suppliers

Outsourcing logistics to 3PLs- Apple supplier hubs managed by Fritz Companies

- SOI program in supplier hubs
- Fritz manages the entire inbound logistics
 - consolidate freight between Asia and the hubs
 - customs clearing
 - hub management
 - local transportation to Apple
- Information system at the hubs: FLEX
 - visibility to pipeline inventory at different stages
- Fritz manages logistics and information processing

Why need operations management?

PRESSURES FROM TODAY'S COMPETITIVE ENVIRONMENT

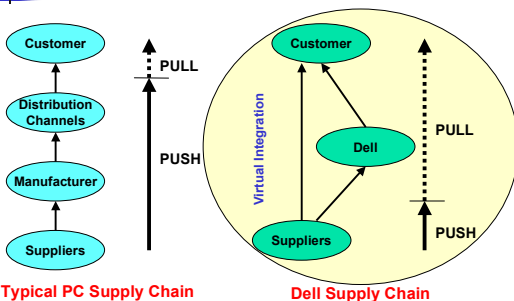
- Rapidly changing market and demand conditions
- Increased competition
- Rapid changes in technology, new business models

Why need operations management?

- Webvan filed Chapter 11 bankruptcy protection and laid off most of its remaining 2,000 workers (July 2001)
 - Spent millions of dollars on high-tech warehouses
 - Realized earlier this year that small-scale delivery services worked better than its costly distribution network. Its first and only market to turn an operating profit was Orange County, where the company operated out of one of HomeGrocer's facilities, which were about a third the size of the massive warehouses that Louis Borders had devised.



PC SUPPLY CHAINS



Dell model

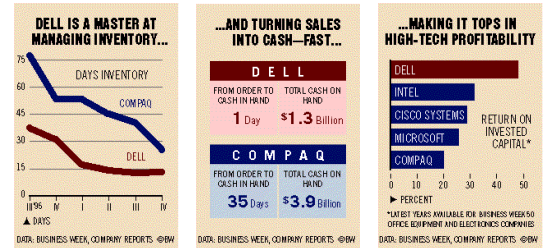
- Suppliers maintain nearby ship points; delivery time 15 minutes To 1 hour
- Suppliers own inventory until used in production
- Demand forecasting is critical – changes are shared immediately within Dell and with supply base
- Customers frequently steered to "recommended configurations" with high availability to balance supply and demand
- Demand pull throughout value chain – "information for inventory" substitution
- Focused on strategic partnerships: suppliers down from 200 to 47
- External logistics supplier used to manage inbound supply chain

Dell Model Benefits



- No production launch until customer order booked (pure pull!)
- Very high product (configurable) variety – mass customization!
- Direct fulfillment - no intermediaries
- Very low finished goods inventory (costs) – high inventory turns (raw material inventory influenced by “recommended configurations”)
- High velocity material flows & fulfillment

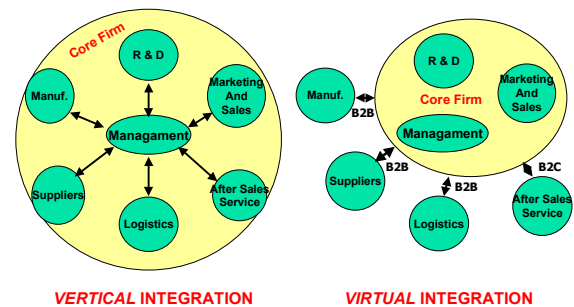
Dell performance



Moving from “Push” to “Pull”

Characteristic	Make and Sell	Sense and Respond
Mindset/Strategic Intent	■ Make and sell products	■ Respond to market
Knowledge	■ Embedded in products	■ Embedded in people
Process	■ Mass production	■ Modular customization
Organization Priorities	■ Efficiency and predictability	■ Flexibility and responsiveness
Assets	■ Physical assets, Inventory	■ Intellectual assets, Information
Operational Concept	■ Vertical integration, Capacity	■ Virtual integration, Capability/Flexibility
IT Architecture	■ Host-centric	■ Network-centric
Market Leader Criterion	■ Share of market	■ Share of customer spending
Strategy	■ Closed, Isolated	■ Collaborative

Vertical vs. virtual integration



Industry initiatives for collaboration

- Voluntary Inter-Industry Commerce Standards Committee (VICS, www.vics.org)
- Collaborative Planning, Forecasting, Replenishment (CPFR, www.cpfr.org)
 - A standard set of processes and a protocol for sharing a wide range of data over the Internet
 - A platform for negotiation before agreeing on a forecast
- Automotive Industry Action Group (AIAG, www.aiag.org)
- Demand Activated Manufacturing Architecture (DAMA, www.dama.tc2.com)