Information Technology and E-Business
Role of Information in Supply Chain Success

Information
- Accurate?
- Accessible?
- Up-to-date?
- Correct form?

Global Scope
- Strategy

Coordinated Decisions
- Analytical Models

Supply Chain Success
- $$$
Information Technology in a Supply Chain: Legacy Systems

<table>
<thead>
<tr>
<th>Strategic</th>
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<tr>
<td>Planning</td>
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<tr>
<td>Operational</td>
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</table>

- Supplier
- Manufacturer
- Distributor
- Retailer
- Customer
Legacy Systems

- Reliable
- Cheap

- Small focus in SCs
- Transactional IT
- Mainframe technology
Information Technology in a Supply Chain: ERP Systems

Strategic

Planning

Operational

Supplier  Manufacturer  Distributor  Retailer  Customer

Potential ERP  ERP  Potential ERP
ERP Systems

- Wider focus
- Real-time information
- Information sharing

- Transactional IT

- Expensive and difficult to implement
  - About 25% of ERP installations are cancelled within a year
  - About 70% of ERP installations go over the budget
Information Technology in a Supply Chain: Analytical Applications

Strategic

Planning

Operational

Supplier Apps

APS

MES

SCM

Transport & Inventory Planning

Transport execution & WMS

Dem Plan

CRM/SFA

Supplier → Manufacturer → Distributor → Retailer → Customer
Information Infrastructure: Required Technologies

- Basic EDI communication system
- Technology to share forecast information
- Sales incentives will have to be transferred from shipment driven to consumption driven (EDLP between supplier and retailer)
  - Volume based vs. lot size based discounts
  - Coupon based discounts
Transportation Infrastructure: Cross Docking

- The movement of materials directly from receiving to shipping with minimum idle time in between.
- Required information
  - What is coming? How is it coming?
  - Quantity and configuration? Markings and identifications?
  - Where is it to be moved when unloaded? Interim and final destination?
  - Any special handling?
- Advance Ship Notice (ASN): Key to improving cross docking efficiency
Receiving Infrastructure: Automated Receiving Technologies

◆ DEX (Direct EXchange)
  – Supplier uses hand held terminal to build delivery invoice as product is being delivered.
    » Truck driver uses a hand held device to prepare an invoice
    » Transmits to receiver who verifies delivery.
    » Used for direct store delivery since it provides flexibility.

◆ NEX (Network EXchange)
  – Automated invoices transmitted electronically from supplier headquarters and available to receiver when delivery shows up.
    » Truck driver does not create the invoice

◆ Which is faster or reliable?
IT Push

IT investment ($B)

Supply Chain Software Push
See Top 100 under /articles.html

Hegel’s Framework applied to IT

◆ Thesis: Data needed
◆ Antithesis: Transactional IT
  – Acquire, Process, Disseminate raw data
  – Overburdened with data

◆ Synthesis: Analytical IT
  – Decision making capability
  – Modeling systems and supporting databases

◆ Avoid: Fancy interfaces with inferior analytic modeling
## Transactional vs. Analytical IT

<table>
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<tr>
<th></th>
<th>Transactional</th>
<th>Analytical</th>
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</thead>
<tbody>
<tr>
<td><strong>Time Frame</strong></td>
<td>Past-Present</td>
<td>Future</td>
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<tr>
<td><strong>Purpose</strong></td>
<td>Observing-Storing</td>
<td>Decision making</td>
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<td><strong>Scope</strong></td>
<td>Myopic</td>
<td>Hierarchical</td>
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<tr>
<td><strong>Databases</strong></td>
<td>Row</td>
<td>Refined-Judgmental</td>
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<tr>
<td><strong>Responsiveness</strong></td>
<td>Real time</td>
<td>Real time and batch</td>
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</tbody>
</table>
Transactional IT Investment

◆ No correlation between transactional IT investment and company success

» “The same dollar spent on the same [transactional IT] system may give a competitive advantage to one company but only expensive paperweights to another.” – Erik Brynjolfsson of MIT

» “Elevating computerization to the level of a magic bullet may diminish what matters the most in any enterprise: educated, committed, and imaginative individuals …” – Paul Strassmann author of The Squandered Computer (Economic Press 1997).

» The [banking] industry’s information technology investments accelerated substantially, but its labor productivity growth rates, though higher than the economy-wide average, actually declined (The McKinsey Quarterly 2002)
EXHIBIT 1

Paradoxical productivity

Index: 1987 = 100

![Graph showing paradoxical productivity over time.]

<table>
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<tr>
<th>Compound annual growth rate, percent</th>
</tr>
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<tbody>
<tr>
<td>Labor productivity</td>
</tr>
<tr>
<td>Real IT intensity</td>
</tr>
</tbody>
</table>

1 Measured as real IT capital stock + PEP (people employed in production); analysis based on US Bureau of Economic Analysis sector data for depository institutions.
2 Measured as real output (transactions + loans + fiduciary activities) ÷ hours worked.
Source: US Bureau of Economic Analysis; McKinsey analysis
Where did the Bank’s IT Investments Go?

EXHIBIT 2

Retail banks: Investing in the customer

<table>
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<tr>
<th>CIO's allocation of investment by business strategy, percent</th>
<th>Business strategy</th>
<th>Major IT initiatives, percent</th>
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<tr>
<td></td>
<td>Customer-information-management and marketing tools²</td>
<td>Call management, customer support, marketing analytics, and sales automation</td>
</tr>
<tr>
<td>40</td>
<td>Consumer database and systems integration</td>
<td>Call management, customer support, marketing analytics, and sales automation</td>
</tr>
<tr>
<td>15</td>
<td>Mergers</td>
<td>On-line banking</td>
</tr>
<tr>
<td>13</td>
<td>Multichannel approach</td>
<td>Other new functionality, such as check imaging</td>
</tr>
<tr>
<td>12</td>
<td>Product proliferation</td>
<td>Other new functionality, such as check imaging</td>
</tr>
<tr>
<td>15</td>
<td>Other applications</td>
<td>Y2K investment²</td>
</tr>
<tr>
<td>5</td>
<td>Disaster avoidance</td>
<td>Y2K investment²</td>
</tr>
</tbody>
</table>

Total = 100

¹Chief information officer.
²Includes investments in additional mainframe processing power required by increases in transaction volume.
³Estimates include all direct and indirect capitalized IT investments in hardware, software, and communications equipment.
⁴Represents only half of total Y2K costs; remaining half was expense.
Source: International Data Corporation; InformationWeek 500, 1996–99; TowerGroup; interviews; McKinsey analysis.
IT Investment Strategy in Retail Banking

◆ Problem: Customer information flow among divisions not smooth

◆ Solution: Integrated database and single customer interface

◆ Improvement: CRM to retain customers and product bundling
  – Cross-selling: Selling home insurance to a mortgage seeker
  – Product proliferation: :
    » "In … 1995, there were a couple of credit cards [at my bank], one at 17 percent interest and the other at 19 percent interest. When I left [in 1999] there were 43,000 pricing combinations.” A US bank executive.
    » 43,000 choices are too many. Customers care more about reliability, service and trust than this many choices.
    » “A mini-mall in your ATM” see Time magazine 03/31/2002 issue.

◆ Bank mergers: Larger complex databases to merge.

◆ Over investment into IT.
  » “Our bank has enough computing/storage capacity to handle entire Europe.” An IT professional at a Turkish Bank.

  – My bank deposits $10 to a customer account if that customer sets up an electronic account.
Time for High-Tech Shakeout


◆ Extra IT demand during 90’s $1Trillion
  » Popularity and transition to ERP, e-CRM, Millennium bug, Internet related computer/software updates, Demand for telecommunication gadgets: cell phones, digital assistants
  - Number of IT companies increased by 15% but demand buy 12%

◆ Obstacles to restructuring of the IT industry
  » IT companies favor IT-people as board members. Board-members share a common interest with CEOs: Delay restructuring as much as possible.
  » Investment bankers do not advocate mergers not to destroy relationships with IT company executives.

◆ Mergers
  - In history, most IT mergers were unsuccessful. But now
    » A big portion of revenues come from licensing so more predictable
    » Savings in sales force (25-30% of revenue)
    » Savings in R&D (10-15% of revenue)
    » Clients favor a single IT company to deal with
    » IT companies are trading below their cash reserves! Savoring investment bankers’ appetite.
      - Who remembers junk bond king Michael Milken, of Drexel Burnham Lambert defaulted in 90s

◆ Prediction
  - Mergers are likely to be initiated by aggressive buyers
    » Case in mind: Mesa Oil company (of Dallas) and T. Boone Pickens’ adventures in Energy
Explore with Analytical IT and Exploit with Transactional IT

- Exploration: Search, discover, experiment, take risk
- Exploit: Refine, reproduce, aggregate

- Over-emphasizing exploitation is common
- Over-emphasizing exploration: Xerox

Future Trends and Issues
- Best of breed versus single integrator
- The role of application service providers
  » Software leasing is preferable for start ups
- The role of the Internet and B2B exchanges
SCM Consultants
Get along well with IT administrators

IT administrators
Exploitors

2. System Integration

3. System Performance

SCM consultant
Explorers

1. Analytic requirements

Managers
Clients
Success with E-Business

◆ Furniture:
  – living.com purchased Shaw Furniture Gallery in March 99.
  – $70 M investment, featured at Amazon.com.
  – Bankruptcy on Aug 29, 2000

◆ On-line grocery
  – Shoplink.com and Streamline.com retired from life after a short life.
  – Peapod.com declared a loss of $29 M in 99. Bought by Royal Ahold whose market price has recently suffered from Enron type accounting (Dutch accounting regulations are not as strict as USA’s.)

◆ Amazon.com lost $720M in 99.
E-Business Applications

◆ Internal Information Flow
  » Morgan Stanley saves about $500K for each info publishing
  » OPRE 6366 web page

◆ B2B interaction
  » The “largest net dealer” (80% of $18.8B sales) Cisco.com saves $250M per year by taking orders online
  » Cisco trains and certifies customers
  » GEPlastics.com facilitates customer innovation and promotes sales

◆ Effective use of resources
  » Amazon.com aggregates its inventory
  » Amazon.com creates customer profiles, effective marketing
Business Transactions

◆ Search
  – Fast, attribute based keyword search
  – Lower customer loyalty

◆ Pricing
  – Anderson Consulting’s BargainFinder for CD’s
  – Amazon’s price comparison engine Junglee
  – English Auction: Max price for a given item
  – Dutch Auction: Min cost subject to specifications
    » Multi-dimensional auctions: Bid for Price, Quality together
    » A simple method to evaluate bids?
    » Termination conditions: when a preset price reached, after a certain deadline, after 100th bid.

  – Marketplaces
Business Transactions

◆ Shipments
  – Fedex.com locates your package
  – Globeranger.com uses wireless technology to locate products in the SC
  – Ship thru internet: e-books, music, films, newspapers

◆ Payment and Settlement
  – Security (course by Wei Yue), encoding
    » Access keys (codes)
  – Electronic money cybercash.com

◆ Buyer-seller authentication
  – Trusted authorities to authenticate
  – Encrypted codes; e-signature is legal since 2000
Business Transactions

◆ Standardization
  – Only low touch – low feel products are suitable now such as books

◆ Legality
  – What is an e-commerce contract?
  – When becomes binding? Information transfer time
  – Taxing of transaction

◆ Visible reputation
  – Power back to the masses, vendors watch out.
    » “If 1000 prospective buyers of Toyota Camrys knew of one another’s existence, they’d have enormous potential clout.” Forbes Magazine April 99
    » An end to information asymmetry favoring vendors.
E-powered strategies

◆ Compete with scale
  – Amazon.com

◆ Compete with coordination
  – Linux operating systems
  – Movie-house type companies

◆ Compete with branding
  – Customer segmentation to catch fragmented attention
  – Customer loyalty, less but still exists
    » People tend to visit same web sites over and over. Ease of navigation, getting used to are still factors but definitely to a smaller extent.
  – Small companies gain global presence
E-powered strategies

  - Push is applied to the portion of the SC where forecasts are certain
    » Dell computers: Push component inventory, demand pulls assembly
    » Amazon.com: Push high demand items to regional warehouse; demand pulls from regional warehouses
    » Peapod.com with pure pull service was about 90%. With several warehouses, service is more than 98%.
    » Wal-Mart launched Wal-Mart.com in 99. An existing SC helps the transition to a push-pull SC.
    » Challenge: How to handle returns? Supply chain or Supply cycle?
E-business Challenges

◆ Integrate Internet to existing SC = Clicks and Mortar as opposed to Bricks and Mortar.
  – W.W. Grainger vs. Gap
◆ Delivery costs?
  – %98 of customers want free delivery when buying on-line
  – Somebody must pay for delivery. Who? Venture capitalists are not willing to volunteer anymore.
◆ Shipment consolidation
◆ Returns?
  – Gap customers return merchandise to stores
◆ Keep customers Informed
  – Fedex
◆ In the final analysis, does e-commerce alter commerce profoundly?
Calico (= California Company)

◆ In early 2000,
  – Calico Commerce B2B e-commerce package
    » For sales of complex products
    » Powers exchanges for trading communities
    » Offers customer convenience, value and choice
    » Strives for mass customization, dynamic pricing and customer loyalty
    » In short, a CRM package
  – 101 corporate customers in 7 key industries
  – 320 employees headquartered in San Jose, Ca
  – Became public in late 1999.

◆ Alan Naumann, CEO of Calico talks on
  – Trends in e-commerce in the context of supplier and buyer relationships
Evolution of Commerce with Internet

- **List Price**
  - Discount prices

- **Products**
  - Low hanging fruit
  - Shopping basket

- **Simple**
  - Come to my site to buy

- **Sell Side**
  - Come to my site to learn

- **USA**
  - Internet use exploded

- **Seller has power**

- **Complex Pricing**
  - Dynamic pricing

- **Services and/or products**
  - Customization
  - Consulting, info source

- **Complex**
  - Internet will explode

- **Multi Dimensional**

- **Global**
  - Buyer knows of choices
Complexity Dominates E-commerce

65% complex

B2C revenue growth to $110B (estimate)

75% complex

B2B revenue growth to $1,800B (estimate)
Bilateral Trade vs. e-markets

Trillion $ Sold online

E-markets

Bilateral trade

2000 2001 2002 2003 2004
B2B Commerce Evolution

**Sell side**
Simple Web page only

**Supply Networks**
Suppliers together make up a supply market place
Contemporary version of Hay Market

**Trading Exchanges**: Marketplaces

**Procurement**
To simplify buying, e.g. Ariba

**Virtual Purchase Networks (VPN)**
Buyers together make up a demand market place
GM-Ford-Daimler Chrysler plans to buy from auto parts suppliers
Buyer – Seller Relationship

◆ Buyers want
  – Personnel content
  – Advice
  – Customized solution
  – Multi-vendor shopping
  – Easy procurement
  – Electronic relationships

◆ Sellers want
  – Tune down marketing to 1 person
  – Solve customer’s problem
  – Differentiate not to compete to avoid price competition
  – Sell more than customer wants, cross-sell, product bundling
  – Efficient contract implementation/sales

Future outlook in 2000: Naumann is optimistic about e-commerce, especially emphasizes experimentation with e-commerce capabilities.
In retrospect from 2002

- Market went down
- Economy slowed down
- Many e-commerce companies could not get beyond web pages
- Venture capital run out
- Even 6 month project span became too long

- Calico filed Chapter 11 of the US Bankruptcy Code on Dec 14, 2001. It was sold to Peoplesoft for $5M. Naumann became the CEO of CoWare in February 2002.

- Calico died but ideas survive.
- Implementation is the challenge!