MIT 8699: Enabling Process Innovation with IT

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Agenda

- The value of IT
- Retail innovations
- IT infrastructure
- Service-Oriented Architecture
Topic one

The value of IT
Many researchers have sought to prove the economic impact of IT spending on firm performance, productivity, profits, with mixed results:

Organizational IT spending ➔ Demonstrable economic impact

From: Davenport
**IT’s effect on BPI**

- **Davenport thesis:**
  IT doesn’t cause higher organizational productivity, however, it can enable process changes that do
  
  \[ \text{IT spending} \rightarrow \text{process innovation} \rightarrow \text{economic outcomes} \]

- Managers need to consider process innovations and potential IT enablers before implementing change
  - What are leading-edge firms doing with IT?
  - What emerging technologies are on the horizon?

**Potential process innovations**

**Potential new technologies**

**Economic outcomes**

From: Davenport
How can IT improve processes?

- **Automational** – robotics, imaging, and automatic call distribution
- **Informational** – makes information available to decision-makers
- **Sequential** – helps to make sequential processes parallel or concurrent
- **Tracking** – real-time tracking systems (as used by FedEx and UPS)
- **Analytical** – expert systems that make decisions automatically or executive information systems that provide information to managers
- **Geographic** – helps to coordinate processes across spatial boundaries
- **Integrative** – enables creation of more holistic “case manager” roles
- **Intellectual** – knowledge management systems that record and share information about FAQs and best practices across a company
- **Disintermediating** – online purchasing systems and exchanges that eliminate middlemen/brokers/agents (e.g., travel agents, stockbrokers)

*The terms that Davenport uses to describe IT are non-standard. Use them to characterize and categorize the potential of using IT to enable BPI*
Combining technologies in BPI

- Davenport characterizes various IT systems for generic organizational processes:
  - **New product development**
    - Automated design; simulation systems; tracking; decision analysis; interorganizational systems (IOS)
  - **Customer order fulfillment**
    - Product choice; forecasting; voice communication; electronic markets; IOS; textual composition
  - **Supply chain logistics**
    - Recognition systems (barcode scanners and RFID); logistical planning; asset management; telemetry systems

**Lesson:** Know your industry, its generic processes, and state-of-the-art IT systems
Topic two

Retail innovations
Technology and process innovation

Clark & Stoddard studied the comparative effect of:
- Technology change alone (EDI),
- Process innovation alone (manual CRP or EDLC),
- Both technology and process change (CRP with EDI)

Which type of change is most effective?

From: Clark and Stoddard
How the grocery industry works

Traditional supply chain practices:
- Retailer contacts the supplier (by phone, fax, mail) to order product whenever inventory is low
- Retailer must determine how much / when to order

Traditional pricing practices:
- Supplier charges the retailer prices that vary over time, depending on supplier’s special promotions
  - During such promotions, retailers may “forward buy” in attempts to take advantage of the promotion.

Effects of traditional practices:
- Unpredictable product demand (due to forward buying), high retailer storage costs
- High “regular” prices (when not on promotion).
- Bottom line: great complexity in terms of pricing, promotions, and retailer ordering patterns
- High inventory costs due to excessive forward buying

From: Clark and Stoddard
Considered process & IT innovations

- **IOS** – interorganizational systems that connects multiple firms
- **CRP** – continuous replenishment:
  - Supplier responsible to monitor sales and to keep shelves stocked with products
    - Sometimes called vendor-managed inventory (VMI)
  - Retailer transmits to supplier data about either:
    - Consumer purchases or
    - Product shipments from the retailer’s warehouse to its stores, but not actual orders
  - Various industries have adopted innovations similar to CRP:
    - JIT – rapid delivery of raw materials to factories for manufacturing
    - QR – quick response; similar concept in retail apparel industry
    - Manual CRP – conducting CRP without EDI or high-tech support
- **EDI** – electronic data interchange:
  - An older electronic document standard that transmits pre-agreed (standardized) product data between a retailer and suppliers
  - EDI does not represent a process innovation, by itself, but has some benefits:
    - Reduces data entry errors, may improve cost / speed of ordering
- **EDLC** (everyday low cost) – supplier charges retailers fixed prices

From: Clark and Stoddard
Clark & Stoddard’s Study

Study innovations’ impact on inventory turns

Two grocery suppliers:
- Proctor & Gamble (P&G) – EDLC and CRP
- Campbell’s – CRP and (optional) EDLC

Two grocery retailers:
- H.E. Butt – very early adopter of CRP
- Hannaford Bros.
  - Phase 1: EDLC
  - Phase 2: CRP with EDI

From: Clark and Stoddard
In general, both process and technology innovation was best.

Process innovation alone (manual CRP or EDLC) was better than IT alone.

From: Clark and Stoddard
Technology trends in retailing

“New retail technologies will focus on streamlining collaboration among SC partners and shift focus from product-centric to customer-centric business”

Technologies:

- Global data synchronization
  - Global register (UCCnet) of products being traded
  - Electronic product codes (ePC’s)
- Collaborative planning and forecasting (CPFR)
  - Requires common view of business processes
- ePC on RFIDs
- Retail optimization and analytics
  - Augmenting judgment with real-time event information
- CRM

From Gartner (Roster, White, Lehong, Fenn)
Topic three

IT infrastructure
The purpose of IT infrastructure

What is IT infrastructure?

- “The base foundation of the IT portfolio (including both technical and human assets), shared throughout the firm in the form of reliable services
- Usually coordinated by the IS group
- It includes technical and managerial expertise required to provide reliable service” (p. 163).

How does it differ from other forms of IT?

- “Shared services available to all business units in the firm”
- Regular IT performs a specific business application, whereas IT infrastructure provides services that enable these applications
- Boundary-crossing refers to infrastructure that “supports information flows and transaction processing across functional area”

From: Broadbent, Weill & St.Clair
What did Broadbent *et al.* study?

- Broadbent *et al.* compared four case studies
- Two from retail industry (MergeCo, StockCo)
- Two from oil/gas industry (LeapCo, CostCo)
- All had generally high levels of IT infrastructure
- Firms with more boundary-crossing IT infrastructure were able to innovate processes more quickly
  - MergeCo and LeapCo had 7 types of boundary-crossing infrastructure, and innovated quickly
  - LeapCo and CostCo had just 4 types of boundary-crossing infrastructure, and innovated much slower

From: Broadbent, Weill & St.Claire
What set them apart?

Only MergeCo and LeapCo had these forms of boundary-crossing IT infrastructure:

- Enforcement of IT architecture and standards (#11) *
- Electronically provide management information (#17)
- Firm-wide data management, including standards (#19)
- Develop a common system development environment (#21)

But all 4 firms had these forms of infrastructure:

- Manage group-wide or firm-wide messaging services (#2)
- Manage firm-wide or business unit applications and databases (#7)
- Develop and manage linkages to suppliers and/or customers (#20)

* The numbers in parenthesis match the numbers from list in Table 3

From: Broadbent, Weill & St.Clair
Lessons learned

There are trade-offs to having more forms of boundary-spanning IT infrastructure:

- Faster deployment of process innovation initiatives
- But higher costs associated with such infrastructure

Why invest in IT infrastructure?

- IT infrastructure can provide firms with flexibility and “real options” to undertake quick innovation
- But be cautious about spending money to develop this capacity unless your firm is likely to need it!
- Issue for IT management:
  - How to make the case for investment in “futures”?

From: Broadbent, Weill & St.Clair
Topic four

Service-Oriented Architecture
Gartner’s take on infrastructure

Developing efficient/flexible infrastructure
Managing efficient/flexible infrastructure
Security Tools
Standard Desktop
IT Perf Mgmt
Improving TCO
Integration/Middleware
Interbusiness Processes
Network Mgmt
Business Intelligence
Storage Mgmt
Web Design/devt/Content Mgmt
Enterprise Portals
Web Services
Legacy IT
ERP
XML
Spam
Real-Time Enterprise
CRM
Mobile/Wireless
Workflow Mgmt
Windows XP
Voice/Data Integration
Vendor/Contract Mgmt Tools
Linux

956 CIOs Surveyed Worldwide

Published March 2004
Web services

- Web services is a new “paradigm” of IT components that firms can use to access an application’s services

- The goals are to:
  - Make system development and operations faster
  - Increase infrastructure flexibility, and
  - Reduce costs

- Key idea:
  - Access applications using standardized (Internet) protocol (SOAP) interfaces and infrastructures
  - Enable transparent access to application services and
  - Application integration across different platforms

- Associated terms:
  - SOA – Service-Oriented Architecture
  - SOAP – Simple Object Access Protocol
  - WSDL – Web Services Discovery Language
  - UDDI – Universal Description, Discovery and Integration
Web services - pictorially

Composite Applications

- Process Management
- Orchestration
- Assembly
- Productivity
- Service Creation
- Rapid Maintenance

Web Services

Other Services

Events

- Inventory Low
- Order Received
- Payment Late

Packaged Business Functions

SOA: Service-Oriented Design of Applications
SOBA: Service-Oriented Business Applications

From: Gartner (D. Plummer)
Gartner’s infrastructural forecast

- Rapid response to change
- Business relationship flexibility
- Lower transaction costs
- Process and goal consistency

- Internally Centralized (Owned Mainframe Era)
- Externally Monolithic (Time-Shared Era)
- Internally Distributed (Mini and PC Eras)
- Externally Distributed (Internet/Web Era)
- Service-Oriented (Web Services Era)
- Event-Driven (Complex-Event Processing)
- Adaptive/Dynamic (Era of Agility)

Increased Agility and Complexity

Hardware, Software, Access, Process, Events, Goals