Service Industrialization in the Global Information Economy

Uday S. Karmarkar
LA Times Professor of Technology and Strategy
Research Director, Center for Management in the Information Economy
The Anderson School, UCLA
Evolving Economies

• Economies around the world continue to evolve at a tremendous pace

• The major trends
  – A continuing shift to services
  – The new shift to information economies
  – Waking giants; growing rapidly
  – Changes in tariffs and multi-lateral agreements
  – Huge shifts in trade and global commerce

• What does this mean for managers? For policy makers?
The Information Economy

• All industry sectors that address the eventual production of information goods and services
• Including
  – Pure information goods: data bases, books
  – Information services: news broadcasts
  – Transactions services: financial services
  – Experiential information goods: music
  – Knowledge based professional services
  – Information transportation: telecommunications
  – Information processing tools: computers
# Picturing Economic Evolution

## Delivery Form

<table>
<thead>
<tr>
<th>Products</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material</strong></td>
<td></td>
</tr>
<tr>
<td>Machines</td>
<td>Tourism</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Retail</td>
</tr>
<tr>
<td>Automotive</td>
<td>Transportation</td>
</tr>
<tr>
<td>Fashion Goods</td>
<td>Construction</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>Health Care</td>
</tr>
<tr>
<td><strong>End product</strong></td>
<td></td>
</tr>
<tr>
<td>Books</td>
<td>Financial Services</td>
</tr>
<tr>
<td>Magazines</td>
<td>Radio</td>
</tr>
<tr>
<td>Computers</td>
<td>TV</td>
</tr>
<tr>
<td>PDA’s</td>
<td>Telecommunication</td>
</tr>
<tr>
<td>Film</td>
<td>Legal</td>
</tr>
<tr>
<td>Music</td>
<td>Consulting</td>
</tr>
<tr>
<td>Software</td>
<td></td>
</tr>
<tr>
<td>Games</td>
<td></td>
</tr>
</tbody>
</table>

**Information**

- Software, Games
- Film, Music
- Computers, PDA’s
US GNP Today and in the Future

Products

Material 11% 9%

Information 20%

Services

20% 80%

30% 50%

50% 80%

41% 59%
The New State of the US Economy

• The US is now an “information economy”
• Information sectors comprise about 60% of GNP value added in the private sector
• Information Services are 50% of the total
• Manufacturing continues to shrink
• Info products morph into services
• Information services (consumer and industrial) will dominate the US economy
Trends and Drivers

• Manufacturing to services shift
• From a material economy to an information economy
• Productivity in manufacturing
• Globalization: diffusion of capability and global competition
• Technology: information technologies leading to industrialization of services
Information Products

<table>
<thead>
<tr>
<th>Products</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, Cement</td>
<td>Restaurants</td>
</tr>
<tr>
<td>Automotive</td>
<td>Retailing</td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>Books, Magazines</td>
<td>Television</td>
</tr>
<tr>
<td>Newspapers</td>
<td>Education</td>
</tr>
<tr>
<td>Music CD’s</td>
<td>Consulting</td>
</tr>
</tbody>
</table>

Material

Information
Technology in Information Chains

- Cameras
  - Capture
- Media
  - Store
- PC/Workstation
  - Process
- Telecom
  - Transport
- DVD Player
  - Consume
Sectors Studied

- Industrial data bases (e.g. electronic components) packaged on CD’s and/or distributed on-line
- Digital distribution of film
- Video delivery as Video on Demand (VoD)
- Personal Video Recorders (PVR’s) impact on broadcast TV
- Publishing and content management
- 3D graphics and digital objects (production)
Example: TV Broadcasting
Rethink Business Models

• Attention capture changes with technologies
• New business models are required
• DVR’s could destroy traditional broadcasting
• Recall that TV broadcasting destroyed movies (though no one seems to know that)
• P2P and theft problem is huge for movies
• New models? Changed video products, different revenue mechanisms, bundling
Music Distribution

- Recording Equipment
- Digital Media
- Capture
- Store
- Physical Media (e.g. CD)
- Ship, retail
- CD Player
- Store
- Transport
- Consume
- Servers
- Internet
- MP3 Player
- Store
- Transport
- Consume
Reconstruction of Info Product Chains

- Logistics transformed by digital distribution
- Traditional distribution dominance is destroyed (publishing, newspapers, TV)
- First copy, second copy economics threaten IP value (P2P barter, copying, and theft)
- Appliances, services influence distribution (Apple, iMode, Sony, SK Telecom)
- Products morph into services
# Information Services

## Products
- Steel, Cement
- Automotive
- Consumer Goods

## Services
- Restaurants
- Retailing
- Construction

### Material
- Computers
- Books, Magazines
- Newspapers
- Music CD’s

### Information
- Telecommunications
- Television
- Education
- Consulting
Technologies in Information Services

- On-line Access
- Interactive Software
- Servers, Software
- Servers, Software
- Telecom, Email

- Access
- Diagnosis
- Process Plan Selection
- Service Execution
- Post Sales
Sectors Studied

- Consumer (retail) banking
- Mortgage banking
- On-line data services
- Medical diagnostic services
- On-line education and training
- News and newsletter publishing
- Management “intelligence” services
Mortgage Banking: Service De-integration and Specialization

- Sales and customer management (agents)
- Loan origination
- Conduit and warehousing function
- Securitization
- Servicing and Master Servicing
- Repurchase and re-bundling
- Secondary market (placement)
- Future: the “paper-less mortgage”
Retail Banking Channels

Decentralized Many

Access Points

Centralized Few

(Cell) Phone Banking

Web/Internet Banking

ATM’s

Desktop software

Mini Branch

Traditional Branch

Old Low

Access Technology and Learning Cost

New High
Retail Banking Channels

- (Cell) Phone Banking
- Web/Internet Banking
- Desktop software
- ATM’s
- Mini Branch
- Traditional Branch
- Access Points
  - Decentralized
    - Many
  - Centralized
    - Few

Access Technology and Learning Cost
- Old
  - Low
- New
  - High
Service Channel Proliferation

- Multiple channels; multiple customer touchpoints
- Integration of customer “view”
- Identification of customer (individual vs. households, multiple accounts)
- Segmentation by access method (who uses what?)
- Backroom integration needs
- Cross selling and the sales robot
- Completely new product opportunities (tailored services)
Diagnostic Imaging

Customer → Queue → Technologist

Machine SCAN

Radiologist Interpret

Image

Archive

Tape

Clerk Transcribe

Report → To Physician
Decoupled Processes

Customer → Queue → Technologist

Radiologist
Interpret

Machine
SCAN

Image

Tape

Clerk
Transcribe

Report → Customer

To Physician
Outsourcing, De-integration

- Outsourcing of scans – being done
- Outsourcing of diagnosis – being done
- Automation of diagnosis? Coming
- Off shore diagnosis? Starting
- Off shore, outsourced transcription – done
- Digital distributed archiving
- Loss of specialization? Referring physicians can read the images
Service Industrialization

• What is “industrialization”?
  – Standardization of products and functionality
  – Standardization of components and piece parts
  – Standardization of work processes
  – Ability to specify and test output requirements
  – Ability to package and ship output

• Additional factors
  – Low cost, reliable logistics (bandwidth)
  – Diffusion of capabilities and technology
  – Competition drives innovation, productivity
Service Transformation

- Technology driven
- Like manufacturing in the 70’s
  - Automation
  - Out-sourcing and virtualization
  - Off-shore sourcing
  - Global competition
- And…
  - Self service (shift processes to consumers)
Service Productivity

• Productivity = $ output/ $ input
• “Computers show up everywhere, except in the productivity statistics…” (Solow)
• The picture has changed; post 2000 evidence of productivity (Jorgenson et al., Brynjolfsson)
• Driven by intense global competition
• Achieved by out-sourcing, off shore, automation and self-service (IT enabled)
• Unfortunately, productivity without market growth can mean a loss of jobs
The Consequences of Productivity

• Our study estimates: Around 10% of service jobs could be outsourced (that’s over 10 million jobs); perhaps 4% offshore?

• Possible losses of 300-500,000 jobs per year for several years

• In addition perhaps 2-4 million jobs will be affected by automation and self-service

• Is this a problem for the US??
No!

- Starting in 2007, baby boomer retirements will more than compensate for job losses
- By 2010, labor shortages will appear
- Each dollar of payroll that goes off-shore returns more than a dollar to the US economy in saving and reinvestment
- Annual cost savings of about $200 billion?
- Foreign workers substitute for immigration
- They don’t consume public goods, welfare, social security or medicare
US 2005

United States: 2005

Source: U.S. Census Bureau, International Data Base.
US 2010

United States: 2010

Population (in millions)

Source: U.S. Census Bureau, International Data Base.

© USK/Sep'04 SI&GIE/31
...and well, Yes

- There will be real dislocations at the individual level, with significant adjustment costs
- Losses in highly visible, urban, white collar, middle class jobs
- Backlash and political agendas
- The new and replacement jobs may not be very attractive
- Competition and price cutting – cost savings don’t equate to profits!
- Unknown consequences for income distribution, tax collection, social patterns
Potential Impact on US Service Jobs

- A similar analysis was performed earlier (Apte and Mason, 1995) using 1990 data.

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service job loss potential (millions)</td>
<td>8.85</td>
<td>10.54</td>
</tr>
<tr>
<td>Total Service Jobs (millions)</td>
<td>87.70</td>
<td>98.54</td>
</tr>
<tr>
<td>% of Jobs that could migrate</td>
<td>10.1%</td>
<td>10.7%</td>
</tr>
</tbody>
</table>
## Potential Service Job Loss in US

(2000 Estimate)

<table>
<thead>
<tr>
<th>SIC Code</th>
<th>Sector</th>
<th>No. of Jobs ('000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>Communications</td>
<td>274</td>
</tr>
<tr>
<td>60</td>
<td>Depository Institutions</td>
<td>362</td>
</tr>
<tr>
<td>61</td>
<td>Non-Depository Credit Institutions</td>
<td>158</td>
</tr>
<tr>
<td>62</td>
<td>Security and Commodity Brokers, Dealers,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exchanges, and Services</td>
<td>150</td>
</tr>
<tr>
<td>63</td>
<td>Insurance Carriers</td>
<td>367</td>
</tr>
<tr>
<td>64</td>
<td>Insurance Agents, Brokers, and Service</td>
<td>166</td>
</tr>
<tr>
<td>67</td>
<td>Holding and Other Investment Offices</td>
<td>48</td>
</tr>
<tr>
<td>73</td>
<td>Business Services</td>
<td>1489</td>
</tr>
<tr>
<td>78</td>
<td>Motion Pictures</td>
<td>55</td>
</tr>
<tr>
<td>87</td>
<td>Engineering, Accounting, Research, Management,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Related Services</td>
<td>690</td>
</tr>
<tr>
<td></td>
<td>Selected Sectors Total</td>
<td>3758</td>
</tr>
<tr>
<td></td>
<td>Other Sectors</td>
<td>6778</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>10536</strong></td>
</tr>
</tbody>
</table>
Current Picture: Functions and Sectors

Based on offerings of 83 third party and 15 captive service providers in India and Philippines

<table>
<thead>
<tr>
<th>Category</th>
<th>Tasks and Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Payment Services</strong></td>
<td>Billing, Account Receivable / Payable Services, Collection Services.</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td>Claim Processing, Form Processing, Back Office Administration / Operations, Network &amp; Security Management, Medical Transcription, Content / Data Management.</td>
</tr>
<tr>
<td><strong>Finance &amp; Banking</strong></td>
<td>Payroll Services, Taxation, Banking Services, Transaction Processing, Financial Research, Project Feasibility &amp; Research Support.</td>
</tr>
<tr>
<td><strong>Human Resource</strong></td>
<td>Payroll and Benefits Management, PF and other retirement benefits management, HR Staffing Services, Consulting and Training, Specialized Staffing and Recruitment Services, Corporate Secretarial services.</td>
</tr>
<tr>
<td><strong>Content Development</strong></td>
<td>eCRM Solutions, Software Design &amp; Development, Product Design, Project Quotation &amp; Development, Graphic Design for media &amp; entertainment.</td>
</tr>
</tbody>
</table>
US private service sector employment

US private information sector employment

US private manufacturing sector employment


US Service Sector Employment
1954-2004

Job Addition: 50mm jobs from 1975 – 2000 or about 2mm jobs/year

IT-enabled Services

Custom Specialized Interactive Cultural

Commodity Standard Technical Off-line

Simple Complex

Basic Web site Advanced Web sites

Technical Hot-line

Call Center Graphic Arts

Data Management Document Mgt

Data entry

Education

Literature Theater

Product Design Medical Diagnosis

Technical Research

Legal Research Custom Software

Technical Publishing

BPO

© USK/Sep’04 SI&GIE/41
The Global Information Economy

• Changes in every sector of industry
• Industrialization of service industries and service functions in all companies
• Global service trade and competition
• Outsourcing and off-shore provision
• Employment impacts are substantial
• Linguistic/cultural patterns of trade
• Internal factors: automation and self-service
Global Information Chains

- Feasibility of outsourcing, off-shore production
- Initially: simple data entry and data processing
- Evolving: information and knowledge based areas; content management and creation
- Lower fixed costs of entry (equipment)
- Improved search, demand and supply matching
- Dropping equipment costs shift bottleneck from hardware, to software to labor, maintenance, ongoing operations
## Most Widely Spoken Languages

<table>
<thead>
<tr>
<th>Language</th>
<th>Approx. number of speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chinese (Mandarin)</td>
<td>1,075,000,000</td>
</tr>
<tr>
<td>2. English</td>
<td>514,000,000</td>
</tr>
<tr>
<td>3. Hindustani</td>
<td>496,000,000</td>
</tr>
<tr>
<td>4. Spanish</td>
<td>425,000,000</td>
</tr>
<tr>
<td>5. Russian</td>
<td>275,000,000</td>
</tr>
<tr>
<td>6. Arabic</td>
<td>256,000,000</td>
</tr>
<tr>
<td>7. Bengali</td>
<td>215,000,000</td>
</tr>
<tr>
<td>8. Portuguese</td>
<td>194,000,000</td>
</tr>
<tr>
<td>9. Malay-Indonesian</td>
<td>176,000,000</td>
</tr>
<tr>
<td>10. French</td>
<td>129,000,000</td>
</tr>
</tbody>
</table>

*Source: Ethnologue, 13th Edition and other sources.*
Language Footprints
Major Language Groups (per capita GNP and Population)
The English World

[Graph showing population by GNP per capita for different languages]
The Spanish World

![Graph showing population distribution by GNP per capita for different languages including Spanish, English, French, Arabic, and German.](image_url)
Globalization of Services

- Increasing degree of globalization
- Linguistic/cultural patterns, colonial history
- Largest linguistic markets: **English (open)**, Chinese (localized), Spanish (open), European languages (localized), Arabic (localized), Indian languages (localized)

- Simpler commodity services globalize first
  - Logistics oriented; telecom
  - Basic services: search
  - Transaction oriented: banking and financial
US Service Sector: Managing for Competitiveness

• What are the right strategies in services?
• Which sectors should be targeted?
• Where will competition be most severe?
• What is the role of technology?
• Where are there sustainable long term positions?
• What will deliver the best results for GNP and standard of living?
Key Takeaways

• The shift to the “information economy”
• Information services: the key sector
• Information commercialization is advancing from data to knowledge and experience
• New challenges for service management: old experience doesn’t work
• Substantial impacts on globalization, trade, industry structure, and employment
• The structure of information services trade follows linguistic and colonial patterns