

SESSION A

GLOBALIZATION FORCES, THE MNC, AND NATIONAL INNOVATION SYSTEMS

The keynote session addressed key forces of globalization and their impact on national innovation systems. Discussion revolved around the role of the multinational corporation (MNC), international entrepreneurs, and the host countries in their development of national innovation systems.

Globalization of Corporate Innovation Systems and NISs

John Cantwell
(Rutgers University, USA and
University of Reading, UK)

CISs tend to reinforce NISs

- The globalization of innovation in MNCs implies internationally integrated CISs that draw on a few geographically dispersed nodes of locally specialized development
- The desire of the firm to tap into a locally differentiated stream of innovation in each such center tends to reinforce local strengths and hence to reinforce NISs

The scope of CISs

- Yet CISs rarely extend to all parts of an MNC's operations - only a few subsidiaries are likely to acquire competence-creating mandates
- Obtaining these mandates depends upon subsidiary-level, MNC group-level, and locational factors - in the latter case the quality of the educational system, the science base, and the other characteristics of the local NIS

Subsidiaries and NISs

- Greater subsidiary-level autonomy raises the ability of the subsidiary to form favorable external network linkages with other actors in its local NIS
- In its turn, the greater the local embeddedness of the subsidiary, the more likely it is to acquire a competence-creating mandate on behalf of its MNC group

Different interactions with NISs

- Strategic independence of a competence-creating subsidiary leads to higher local innovative effort, and more beneficial spillovers to and from other local actors
- But strategic independence in other subsidiaries is likelier to lead instead to an increase in other functions such as local marketing effort, with few spillovers

Technological diversification of firms through CISs

- Stronger MNCs tend to retain at home a higher proportion of technological development in their primary fields
- International CISs are used to promote the MNC's own comparative technological diversification, in centers (NISs) specialized in complementary fields, and in all-round centers of excellence developing GPTs

Trade-offs between NISs and CISs

- Occasionally NISs have such tight local inter-industry coupling that local networks become a barrier to engagement with international CIS networks rather than complements to them
- The more locally vertically integrated an industry in a NIS, the less internationalized it tends to be in its research strategy

Non-MNC-diversifying CISs

- There are three conditions under which MNCs use foreign facilities to deepen innovation in their primary fields rather than widening it into new areas of exploration
- (i) If the home country technology base is simply too small when a leading world company originates from a small country or one lacking relevant resources - eg. Philips

Industries for which GPTs are the primary technologies

- (ii) GPTs are best developed in suitable all-round centers of excellence that bring together the firms of various different industries
- So eg. Swedish-owned mechanical engineering firms engage in as much industrial equipment development abroad as they do at home

Inter-industry relatedness

- (iii) The home base may lack diversification into (what have become) the most connected industries or technological fields
- Thus, eg. Swiss pharmaceutical companies have invested in the US in part owing to the advantage of the US NIS in ICT and biotechnology, and the growing significance of combining capabilities in these fields

Home and host country NIS structures influence CIS patterns

- When research agendas are linked across specific industries in the given historical context of a NIS, it influences the direction of diversification in outgoing and incoming CISs
- Thus, eg. foreign metal companies undertake food research in the US, German-owned machinery firms conduct chemical research abroad, while UK chemical and pharmaceutical MNCs are drawn into work on aircraft technologies abroad

The new focus of the state on national innovation policies

- The state has less autonomy over macro policies, but a greater role in facilitating the NIS and encouraging entrepreneurship in areas of local expertise and specialization
- The objective is to raise participation in an ever-expanding network of international knowledge flows in which each country searches for its distinctive contribution

NISs and globalization - to recap

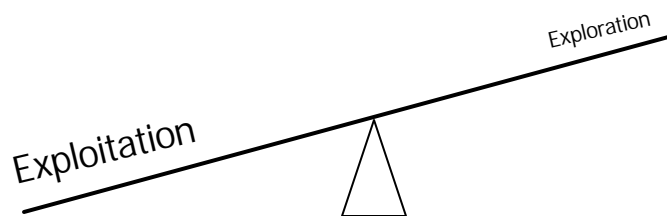
- Science-technology linkages have become more important than ever within NISs, enhancing national specialization or variety
- A well-functioning NIS relies on local inter-company networks for cross-licensing and other mutual knowledge exchange
- Once again, NISs have become more (not less) important in a globalized environment

**MNC STRUCTURES IN GLOBALIZED
MARKETS – REFLECTIONS OF
EXPLOITATION OR EXPLORATION?**

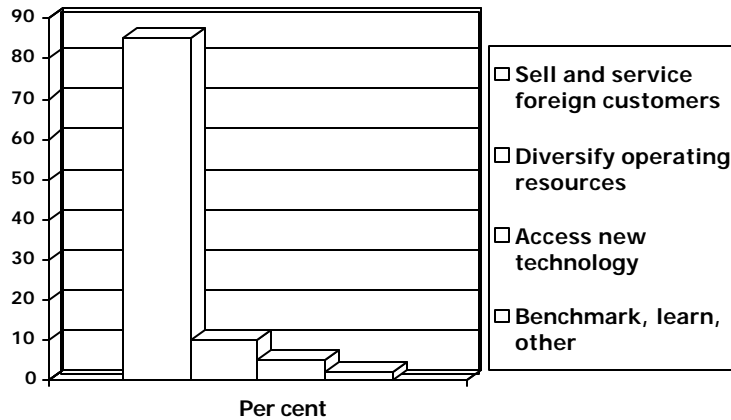
Ivo Zander

The Logic of International Expansion

The logic of international expansion

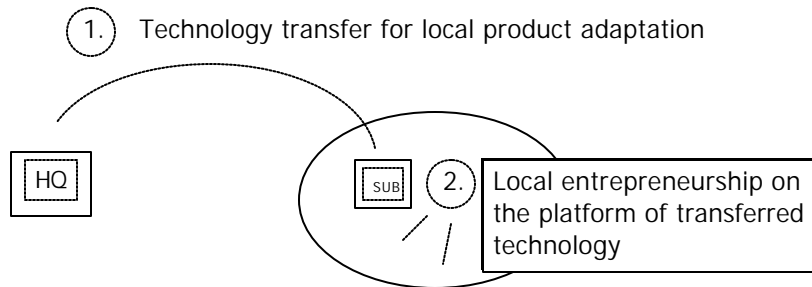


Main motives for entering foreign markets



But, motives vary across firms and industries

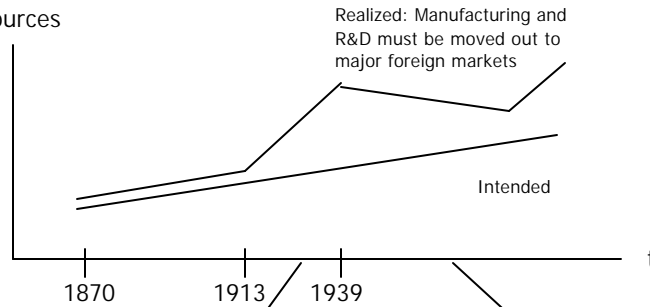
The traditional effect on foreign R&D and local innovation systems



- ✓ Increased interaction with local customers and innovation systems, renewal and reinforcement of local strengths
- ✓ 'Instant embeddedness' through foreign acquisitions

Market integration and MNC activity

Dispersion of resources



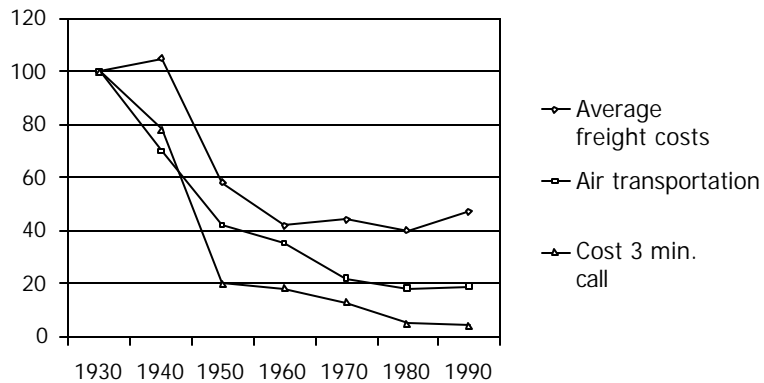
Protectionism:

Nationalism,
trade restrictions,
currency exchange
restrictions, ...

Global and regional integration:

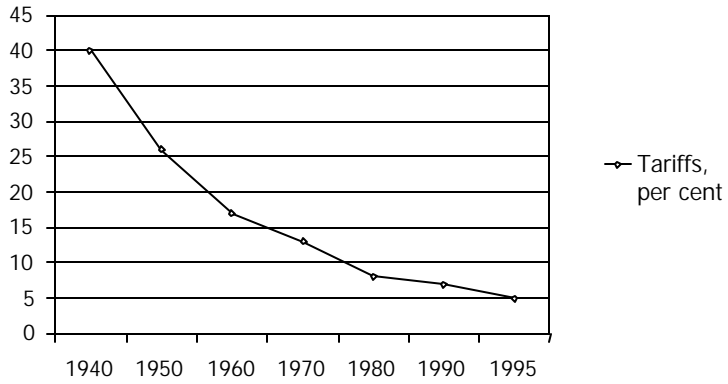
- Reduced trade restrictions (GATT/WTO, EEC/EU, EFTA, LAFTA/LAIA, ASEAN)
- Lowered transportation costs
- IT-revolution,...

Transport and communication costs



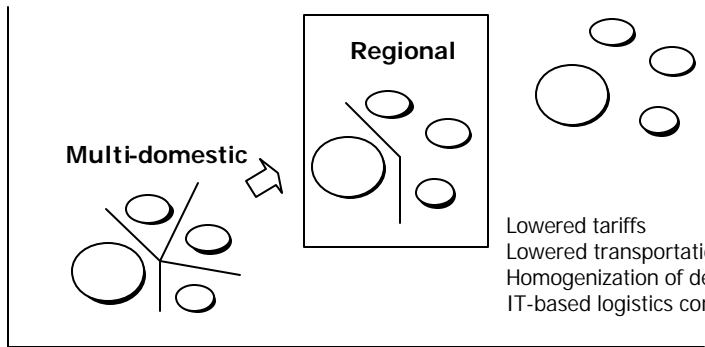
Institute for International Economics, 1991

Average tariffs



Market integration and industry competition

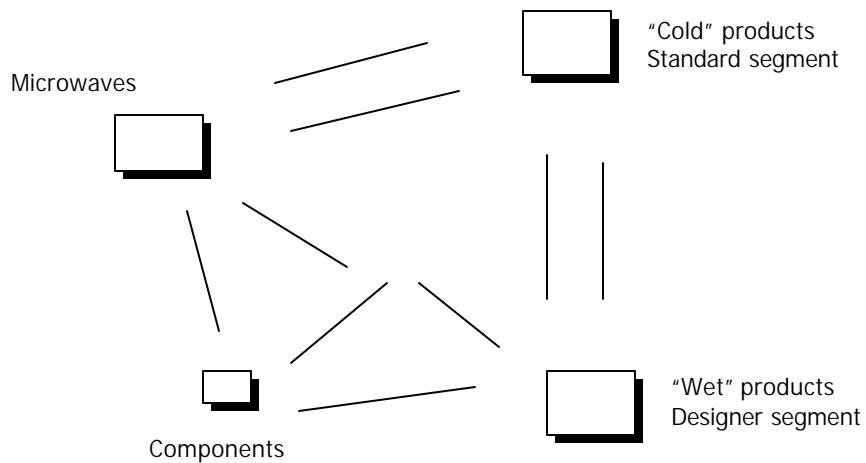
Industry competition



Electrolux' strategy in the white goods industry

1. Expand through foreign acquisitions
2. Retain leading local brands
3. Centralize production to few locations:
Close local production, transform acquired companies to sales subsidiaries
4. Centralize production of components

Electrolux' ideal division of labor

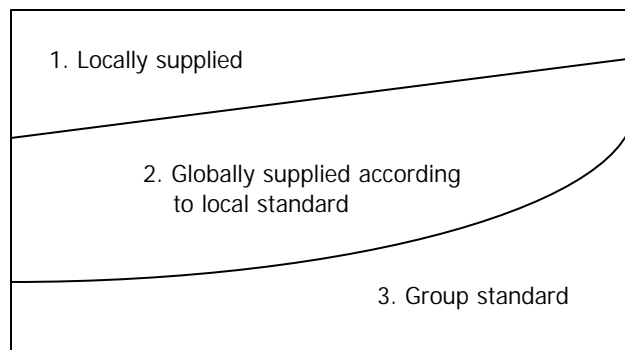


ESAB's strategy in the welding industry

"Pay rock bottom prices for companies in trouble, then consolidate and modernize production to reduce costs."

Gösta Bystedt

ESAB's product strategy



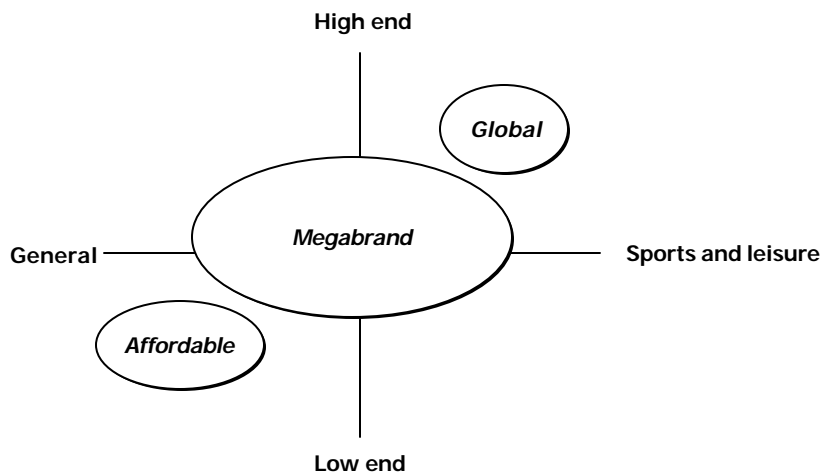
1. Local machine types, locally modified equipment
2. Acquired brands, centrally manufactured according to local demand
3. Strategic products, centrally manufactured with global standard, rapid delivery

Cycleurope in the bike industry

"I invited all product managers to a group meeting concerning saddle designs. We all gathered in one room, and there were 650 different models presented!"

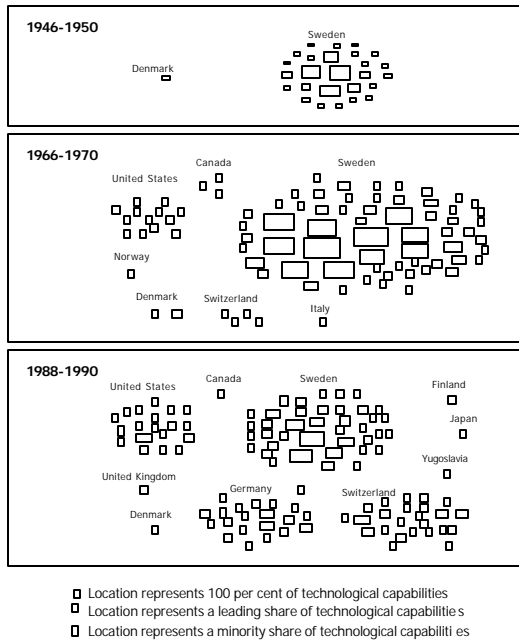
Tony Grimaldi

One strategy for brand positioning



ASEA/ABB's international innovation network

Consequences for Innovation Structures



A large-firm perspective on global innovation

Consequences for Innovation Processes

"International R&D projects - as much as necessary, but as little as ever possible!"

"... 'best practice' in international R&D-project management in corporations here precedes theory."

Gassman (1997)

The 'modern' MNC - A Global Pipeline?

Organizational characteristics

- ✓ Outsourcing of manufacturing and associated research and development
- ✓ Global search for new products and services to fill existing market channels

Sources of competitive advantage

- ✓ Global brand, global market channels, logistics management
- ✓ Management and coordination of external networks

Global Location of Production and Services

Martin Kenney

UC Davis

&

Berkeley Roundtable on the International Economy

and

Rafiq Dossani

Stanford University

Forces Driving Globalization

- **Transportation and communications**
 - Cheaper, faster, and better (esp. telecom)
- **Time and Speed**
 - Rapidity of obsolescence, time to market
- **Knowledge, capabilities and clusters**
 - Will Silicon Valley, Wall Street, City of London, Hollywood, Milan, Napa Valley lose their edge?
- **Proximity to the customer**
 - Which corporate functions

Forces Driving Globalization (continued)

- Proximity to the customer
 - Which corporate functions
 - Marketing, R&D, Production, Prototyping?
- Pricing pressure and over-capacity
 - We are in a world where pricing pressure will be continuous
 - Over-capacity
 - New locations
 - Technological change

What Is Happening in Services

Any service that does not require a physical presence is susceptible to offshoring

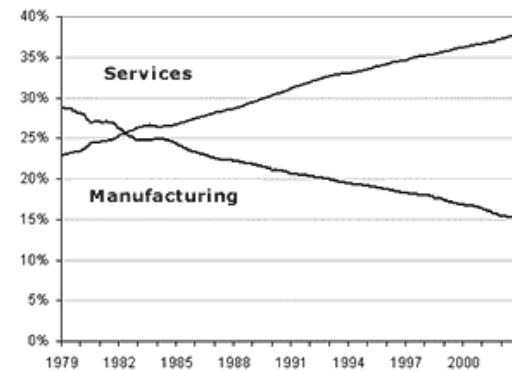
It is not just about call centers or software or R&D or x-ray analysis or medical transcription

It will affect the employment patterns in a wide variety of industries in multiple ways

Why Is It Important and Who is
Doing It?

Services a Critical Part of the U.S. Economy

Industry Share of Total Private Employment

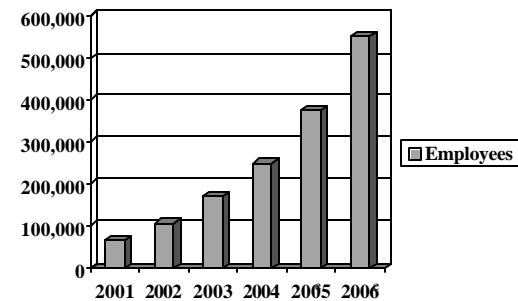


Source: http://www.uaw.org/publications/jobs_pay/03/01/jpe05.html

Destinations for Relocated Business Services

- India is receiving the most
 - Ireland -- 10,000 (services for Europe)
 - Philippines -- 30,000 (December 2003)
 - China -- ?, relatively small
 - India -- 250,000 (growing >50%) + 480,000 in software growing at 20% (March 2004) [~65% from U.S.]
- Canada, Anglophone Caribbean, Mexico, Costa Rica, Colombia

Business Process Employment in India by Year



Source: NASSCOM-McKinsey



Types of Organizations Undertaking Offshored Work

- MNC Generalists -- Amex, Citicorp, Dell, GE, HP, HSBC, Intel, Oracle, TI, etc.
- MNC Outsourcers -- Accenture, Convergys, EDS, IBM, Sitel, etc.
- MNC Specialists -- Kampsax, Reuters, Teletlas
- Indian Generalists -- Daksh, EXL, Infowavz, vCustomer etc.
- Indian Specialists -- Toonz, Thomson India, etc.
- Indian IT Firms -- Infosys, HCL, TCS, Wipro etc.

The Dialectic Between Technical Enabling Conditions and Business Drivers

**Technical Enabling
Conditions**

Business Drivers

**A learning-by-doing process in which
there have been failures**

The Technical Enabling Conditions

- Separation of information from physical media
 - So they need no longer be done in close proximity to customers
- Global availability of low-cost telecom bandwidth and computing power
- Y2K increased penetration of standardized SW packages, e.g., SAP, Oracle, PeopleSoft available globally [reduce asset specificity]

Business Drivers

- Pressure to bring down costs
- Rivalry -- rivals have done it so must follow
- Evangelists such as Jack Welch, Michael Dell, and Carly Fiorina
- Acceptance of reengineering and outsourcing various services
- Experience w/offshore software production in India

Key Benefits

- Capable labor available in large quantities in a wide number of categories
 - They are capable of process improvement
- Savings can be great --
 - Labor costs are approximately 25% of developed country
 - But can be even less for certain skilled activities
 - On a process 40% saving is possible
- High levels of entrepreneurship

Wages

Costs Per Engineer

- Software engineering graduate in India earns \$5,000 per year while the comparable salary in the U.S. could be high as \$45,000
- 5 year Java EE experience, with CS/EE degree: US range \$55,000-\$80,000 (plus benefits); Bangalore: \$6,000 (incl. benefits)
- Lower percentage difference at higher levels, but the actual dollar savings are great

Wage Costs in Four Different Asian Markets

	Mumbai	Manila	Kuala Lumpur	Shanghai
Call Center	\$1.50	\$1.47	\$2.19	\$2.50
Back Office	\$1.35	\$1.73	\$1.86	\$2.03
Doc. Conversion	\$0.70-1.00	\$1.07	\$1.47	\$1.50

What Is Being Offshored?

The Areas of Service Offshoring

- Software production
- Business processes, both voice and non-voice
- Design
- Research and Development

Anything not requiring physical presence

Leading Industries

- Information technology and computing
 - Telcos (Verizon, AT&T etc.)
 - Equipment providers (HP, Dell, Cisco etc.)
 - Software firms (Microsoft, Oracle, SAP etc.)
- Financial, insurance, real estate
- Retail (Safeway, TESCO, Federated etc.)
- Healthcare and benefits provision

Engineering

- Adaptec, AOL, Cisco, Google, Intel, Microsoft, Oracle, Qualcomm, SAP, and Veritas have large and growing engineering centers in India
 - GM Technical Centre - Bangalore - 260 persons and growing -- part of GM Global Engineering
 - GE John F. Welch Technology Centre -- 1,600 and growing
- Also outsource work to MNCs operating in developing nations and indigenous firms

A Job at Intel India

- **CAD Engineer:** Hardware Engineering is all about finding solutions. As a CAD (Computer Aided Design) Engineer with the Intel Hardware Engineering team, you'll work on teams designing, developing and implementing solutions. As part of Hardware Engineering at Intel, you'll have the opportunity to be involved from start to finish on the development of world-class innovations.

Responsibilities

As a CAD Engineer, **you will be involved in developing new very large scale integration (VLSI) CAD tools and methodology solutions for design for testability (DFT) and test generation for high volume manufacturing of next generation microprocessor products.** You will be responsible for development, deployment and maintenance of in-house fault simulation and test generation tools. This position will be based in Bangalore, India.

Qualifications

You must possess a Ph.D. or Master of Science degree in Electrical Engineering or Computer Engineering with five to ten years of related work experience. Additional qualifications include: Extensive knowledge of Digital Design and Design-for-test principles, digital circuit/fault simulation and automatic test pattern generation.

Good working knowledge in developing CAD tools using C++ in a UNIX*/Linux* environment.

Excellent experience in a related people management role would be an added advantage.
Accessed April 9, 2004
Requisition.asp?Posting=34339

An Opportunity at Cisco India

Title: Software Engineer

Experience: 3 -5 years experience with Unix and C.

Experience with Linux definitely a plus.

Experience with creating and running regression tests, writing test scripts, test harnesses with perl and C .

Knowledge of performance measurement techniques and benchmarking

Experience with one or more of the following protocols from a QA/ certification point of view:

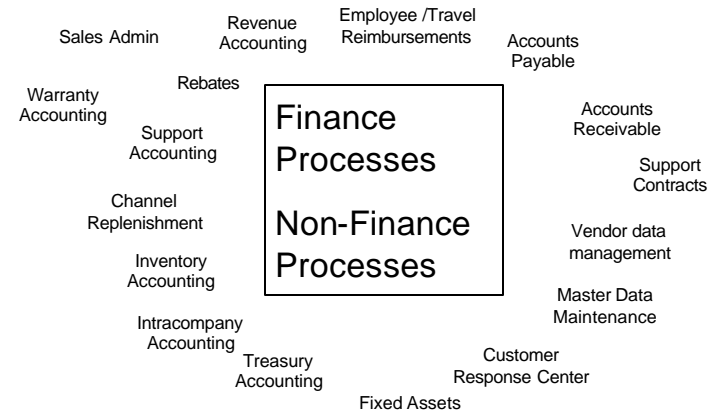
NFS, CIFS, SMTP, IMAP, POP, NDMP, LDAP, Radius, Kerberos, DHCP, DNS, FTP.

Experience with certification and qualification of 3rd party applications

Description: Technical, Industry, Business and Cross-Functional Knowledge. Partnership. Solve Problems & Make Decisions. Demonstrate Leadership. Establish Plans. Think Globally. Dedication to Customer Success. Innovation and Learning. Acknowledged technical expert on project.

Education: Typically requires MSEE/CS combined with 5-7 years of related experience, or BSEE/CS combined with 7-10+ yrs related experience.

Processes Moved by One Large Firm



Not Simple, There Are Many Challenges

- Within U.S. operations
 - Employee morale
 - Is the process as modular as firms believe?
 - Political issues -- local, state, national
- Moving the process
 - Planning and designing the contract to create a win-win situation and then managing the migration
- Achieving U.S. quality levels can take time, but with proper management attention similar levels are sustainable or even improvements can be made

Not Just for Cutting Cost, It Can Create New Income

- Firm formerly only sample audited certain insurance claims, due to lower cost accounting labor now can audit all claims
- Medium-sized mortgage firm able to dramatically expand business drawing upon the capabilities and lower-cost structure of Indian sub-contractor
- Newspaper firm able to digitize previously paper and microfiche archive creating an easily marketable product

Conclusion

Issues to Consider

- Has been very rapid
 - GE expanded from 12,000 to 20,000 (2003-2004)
 - Dell had no employees about 2 1/2 years ago, now over 3,000 (call center, software coding, back office)
- The number of service activities amenable to offshoring are incalculable and can be expanded
 - Radiology at Mass General
 - Ph.D. statisticians (actuaries) General Electric
 - Intel design of a next generation Xeon processor

The firms are still learning
The problems we hear about appear to be glitches rather than fundamental problems

The Cost and Benefits for the U.S.

- Benefits
 - Lower cost services
 - Purchases of U.S. products
 - Greater efficiency
 - Better quality?
 - Indian middle class
 - New consumers?
- Costs
 - Job loss?
 - Downward pressure on wages?
 - Disrupted career ladders?
 - Tax losses?
 - Quality of service?

How Far Will It Go?

Issues

- Will this be a reprise of manufacturing?
- How fast? Some firms expanding at 100% per year -- Forrester recently increased estimates
- In the firm there is a pyramid of activities -- how much is not place dependent?
 - For what is moveable, how much can be done in lower cost locations?
 - If the middle of the pyramid relocates what happens to career paths in U.S.?
 - If the reorganization of the pyramid is profound, what will be new business model?
 - What might be the impact on U.S. educational institutions?

What Is Not Moveable?

- In-person services (Reich 1990)
- Activities that require face-to-face interaction with customers, suppliers, designers, or production facilities
- Activities where knowledge is derived from intensive, iterative interaction with the market or environment, e.g., clusters
- Activities that geographically bound, e.g., Napa Valley

Questions?

