

MANUFUTURE'2007

Constructing a Sustainably
Competitive Europe

Porto, December 2nd-4th, 2007

Global Manufacturing

—

An Eastern Perspective

Mitchell M. Tseng

Advanced Manufacturing Institute



香港科技大學

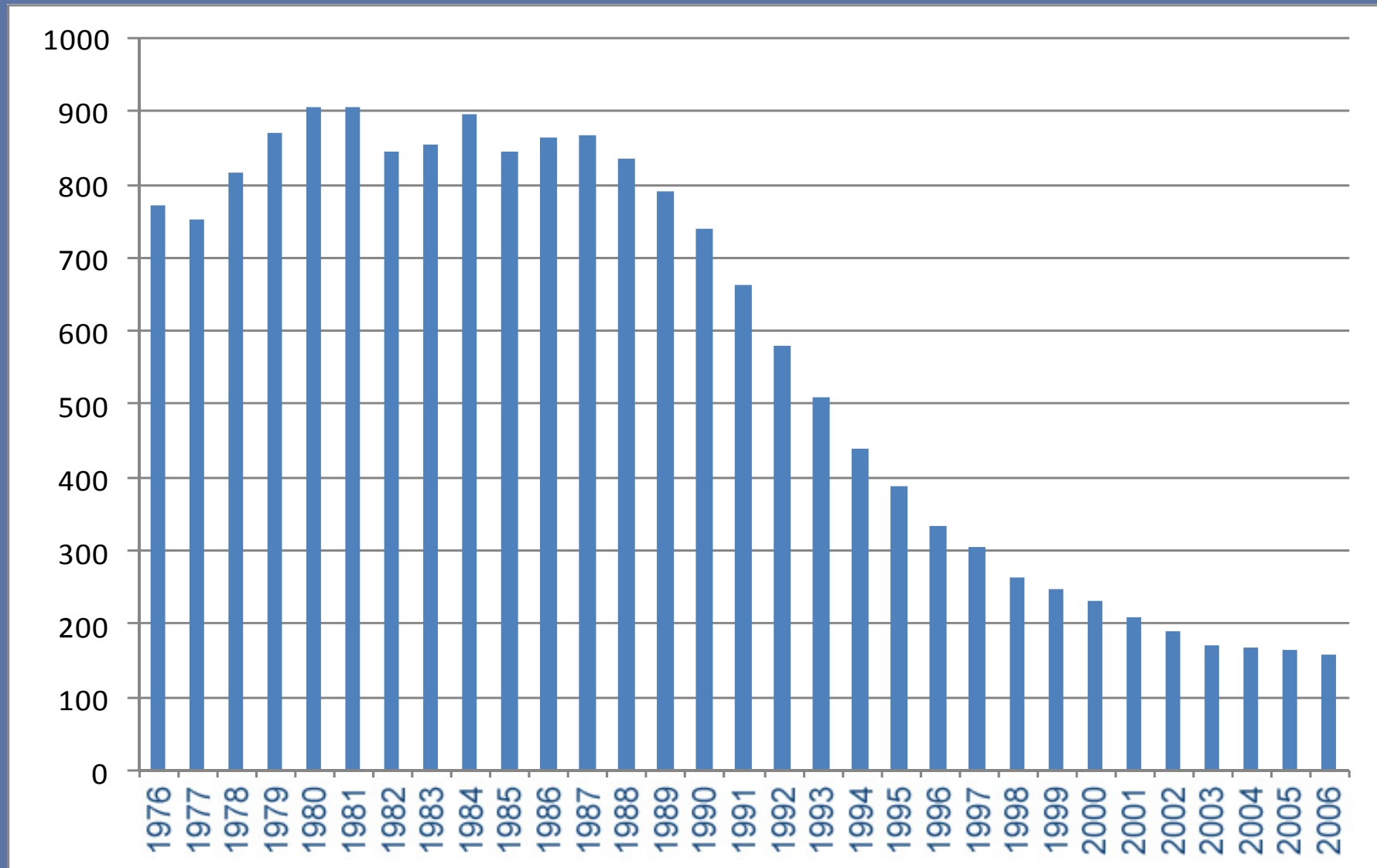
THE HONG KONG UNIVERSITY OF
SCIENCE AND TECHNOLOGY



香港科技大學

THE HONG KONG UNIVERSITY OF
SCIENCE AND TECHNOLOGY

Paid Employment in HK Manufacturing (Thousands)



Source : Key indicator of the Labor Market, International Labour Organization



Agenda

- ❑ A Flatter World
- ❑ The Rise of “Manufacturing Powerhouse”
- ❑ Current Issues, Environment and IPR
- ❑ Look into Future through the Lens of Pathfinders
- ❑ 7 Observations
- ❑ Meeting the Challenges in Universities



The World is Flatter

„The Triple Convergence”*



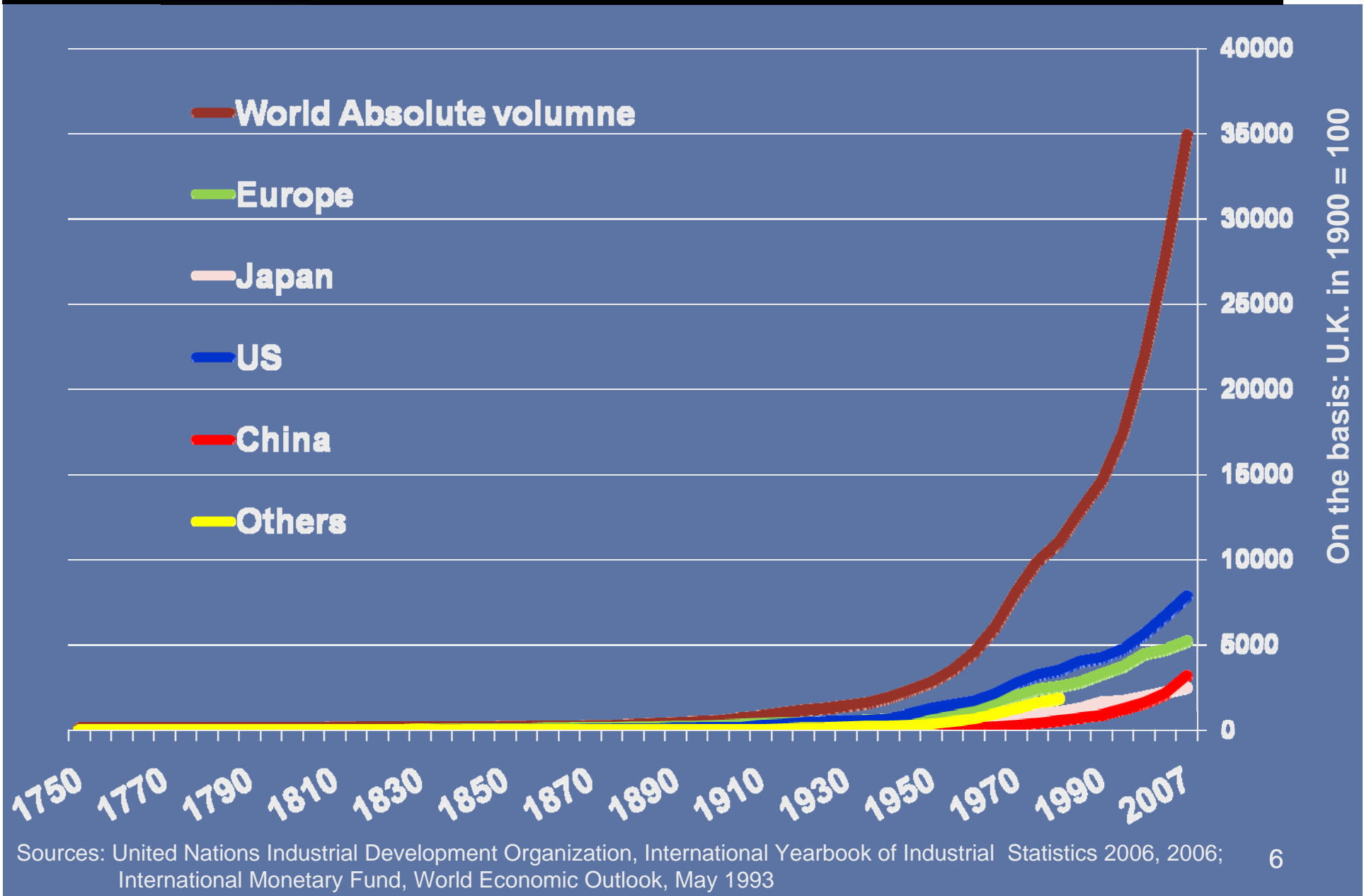
Are the flatteners
still in place?

=> yes!

* Friedman, T.L., The World is Flat,⁵ 2005



Absolute World Industrial Outputs



Slide 6

t1

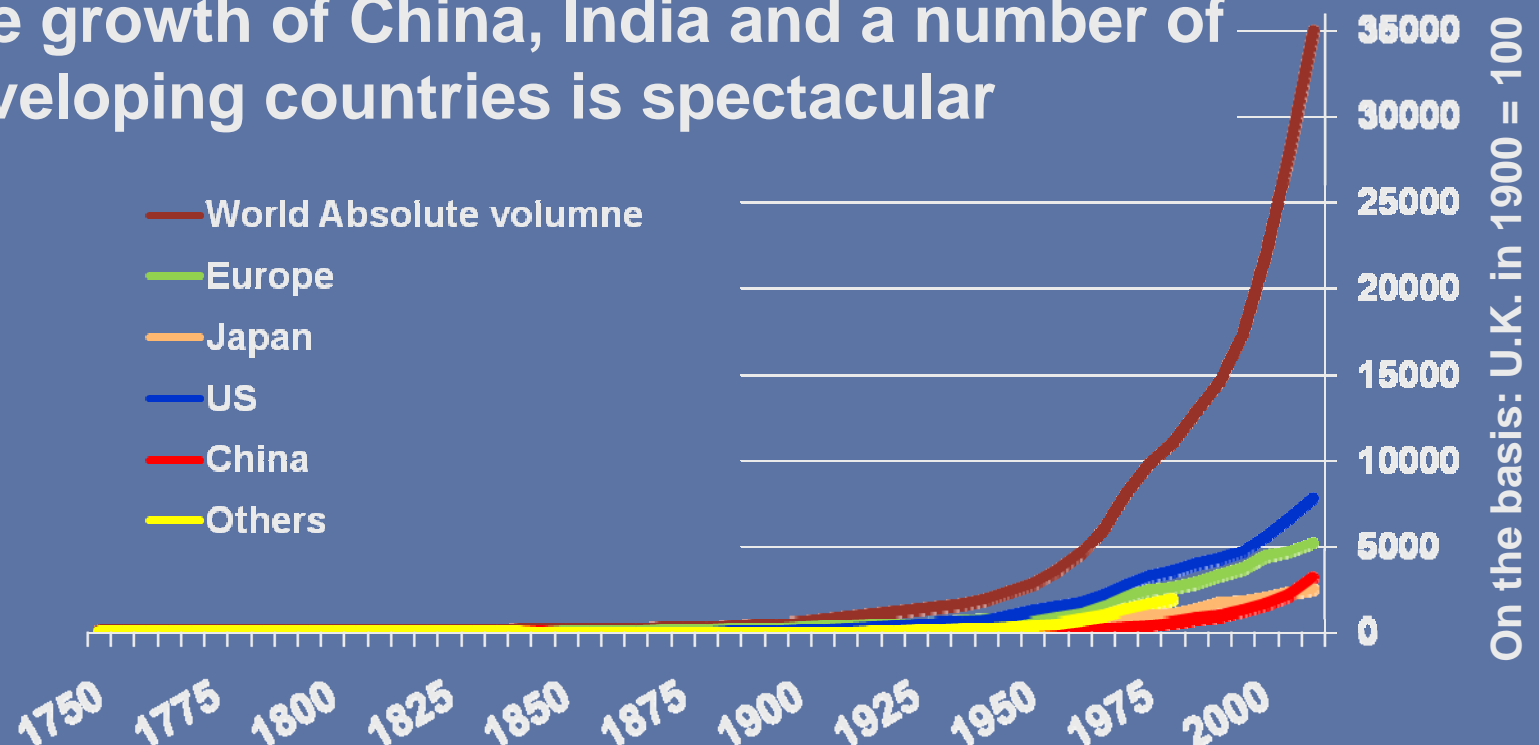
tseng; 27-11-2007

Introduction

The world is flatter



- The world in general is better off as a flatter world.
 - We all are enjoying a long period of unprecedented prosperity with low inflation rate
 - The growth of China, India and a number of developing countries is spectacular



Sources: United Nations Industrial Development Organization, International Yearbook of Industrial Statistics 2006, 2006;
International Monetary Fund, World Economic Outlook, May 1993



| In 2007 | China | India | US | EU |
|-----------------------------------|-------------------|------------------|-------------------|------------------|
| Population | 1,321 million | 1,129 million | 301 million | 491 million |
| Population growth rate | 0.60% | 1.61% | 0.89% | 0.16% |
| GDP (PPP) | \$ 10.21 trillion | \$ 4.16 trillion | \$ 13.06 trillion | \$13.08 trillion |
| GDP (PPP) Real Growth Rate | 11.1% | 9.4% | 2.9% | 3.2% |
| GDP (PPP) Per Capita | 7,729.0 \$/p | 3,684.7 \$/p | 43,388.7 \$/p | 26,639.5 \$/p |
| Below poverty threshold | 10% | 25% | 12% | 16% ² |
| Unemployment rate | 4.2% | 7.8% | 4.8% | 8.5% |
| Investment | 40.9% of GDP | 29.5% of GDP | 16.5% of GDP | 20.8% of GDP |
| Industrial Production Growth Rate | 22.9% | 7.5% | 4.2% | 2.6% |



The Reality

“I want to tell you frankly that China is still a developing country with a large population, a weak economic foundation and underdeveloped productivity. This is a reality that has basically remained unchanged.”



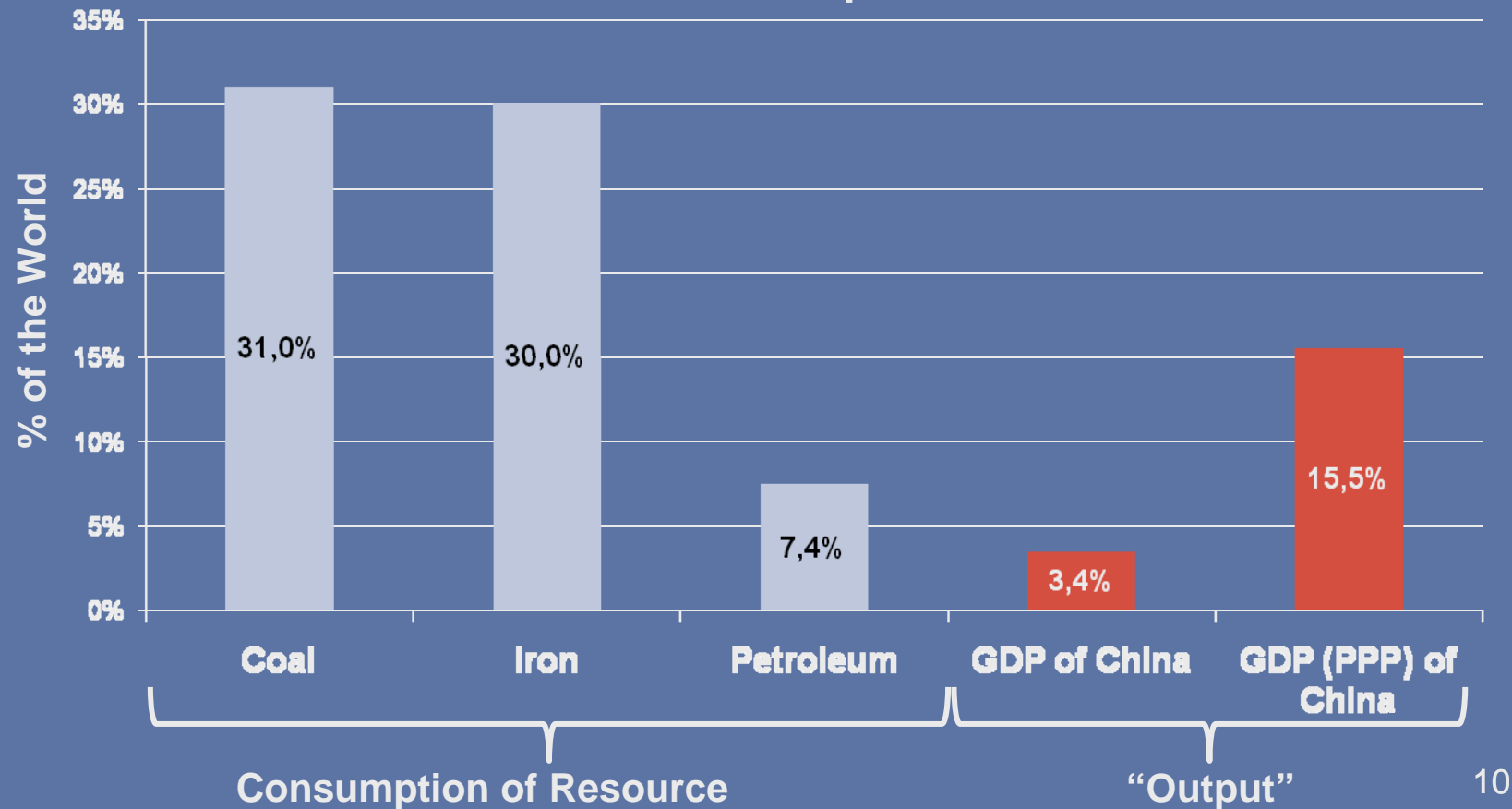
Premier Wen Jiabao at the
World Economic Forum in Dalin, October 2007

Put in Perspective



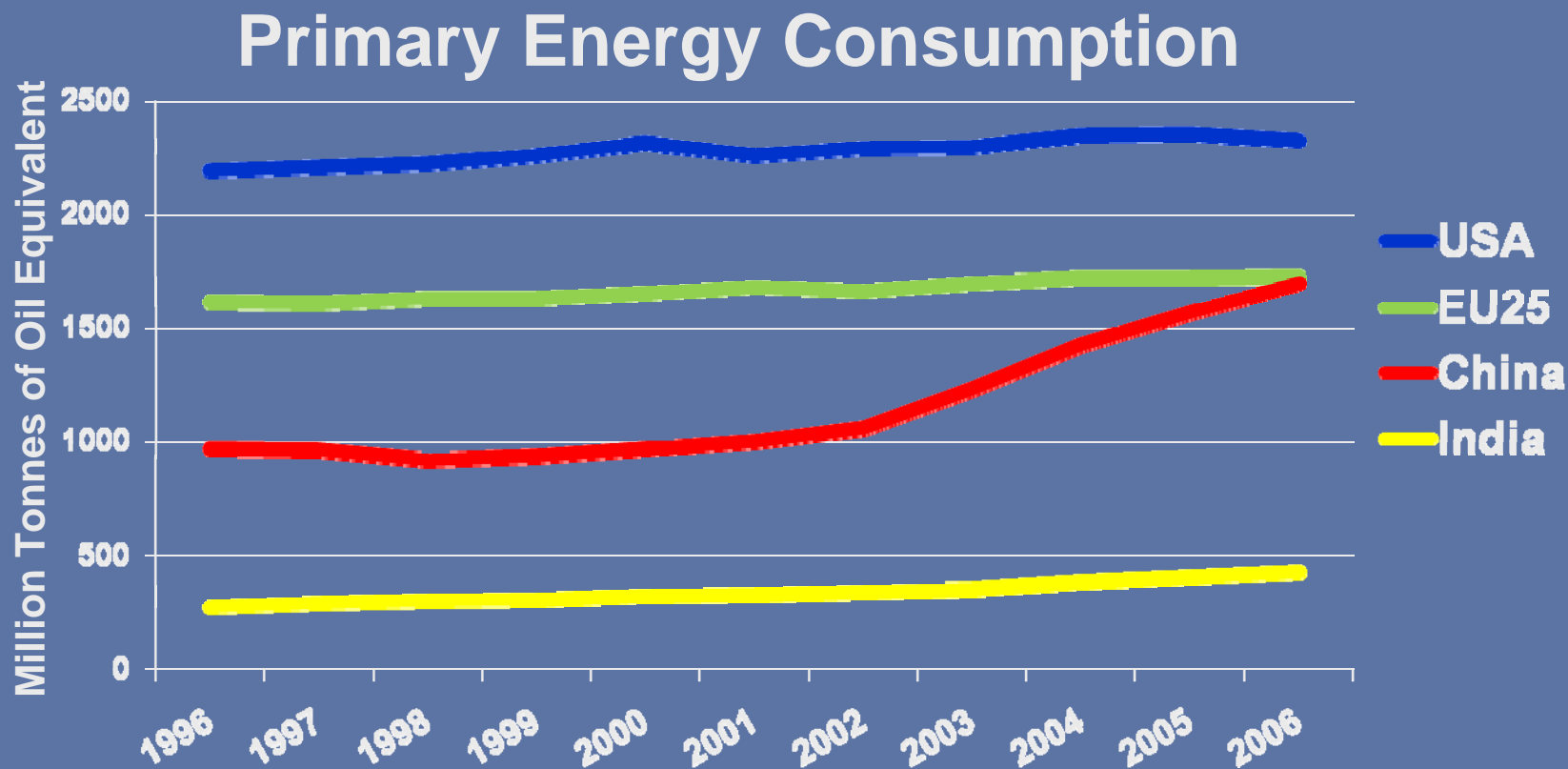
- Chinese population contributes to 20.5% of world population but China takes up 6.3% of world continental area

Chinese Share of Consumption of Selected Resources and Its GDP Output



Source: World Bank Report 2002

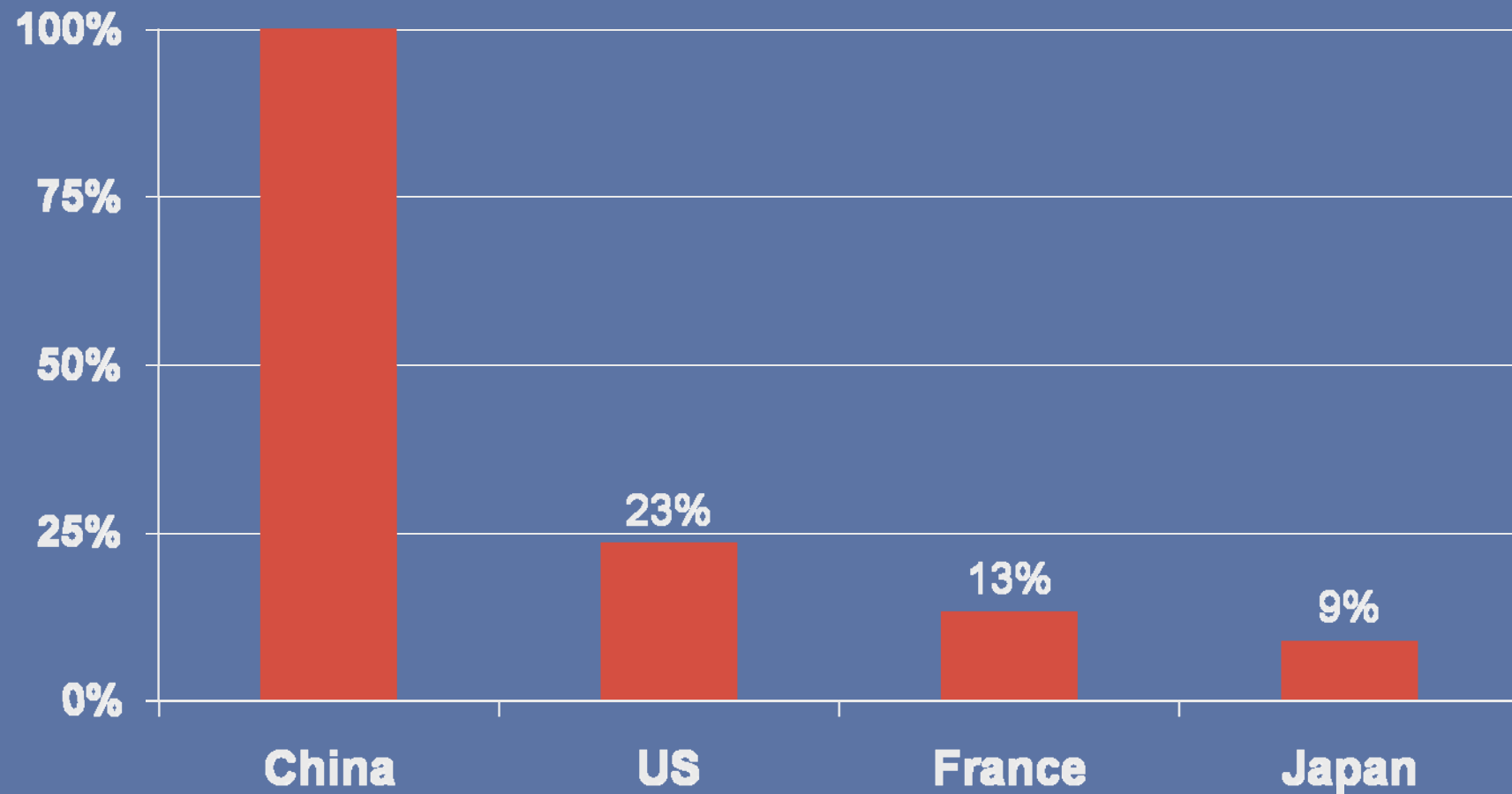
Primary Energy Consumption



| | In 2006 | Change 2006 over 2005 | 2006 share of total |
|--------------------|----------------|--------------------------|------------------------|
| USA | 2326,4 | -1.0% | 21,4% |
| EU25 | 1722,8 | 0,2% | 15,8% |
| China | 1697,8 | 8,4% | 15,6% |
| India | 423,2 | 5,4% | 3,9% |
| TOTAL WORLD | 10878,5 | 2,4% | 100,0% |

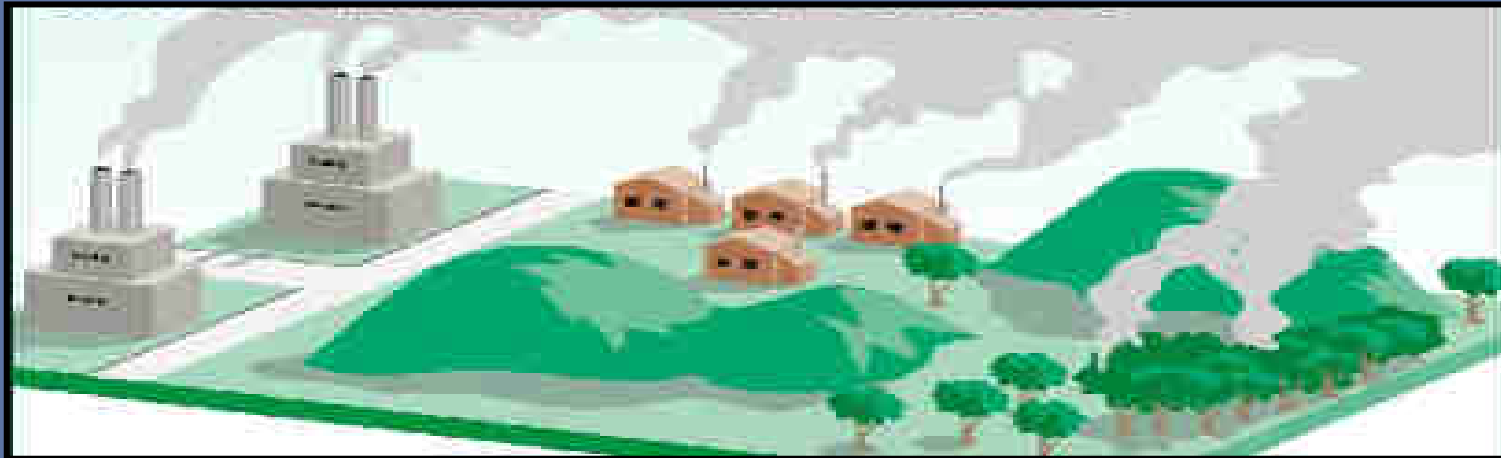


Relative Energy Consumption per US\$ GDP





Major objectives until year 2010 from the minister of the National Development and Reform Commission (NDRC)



- Reduce the emission of pollutants by 10% during the 11th Five-Year Plan
- Reduce the emission of SO₂ by 10%
- Reduce the emission of COD by 14%
- Reduce coal consumption by 20%
- For each manufacturing value added entity:
Reduce the water consumption by 30%
- Achieve at least 70% water wastage treatment

COD: Chemical Oxygen Demand

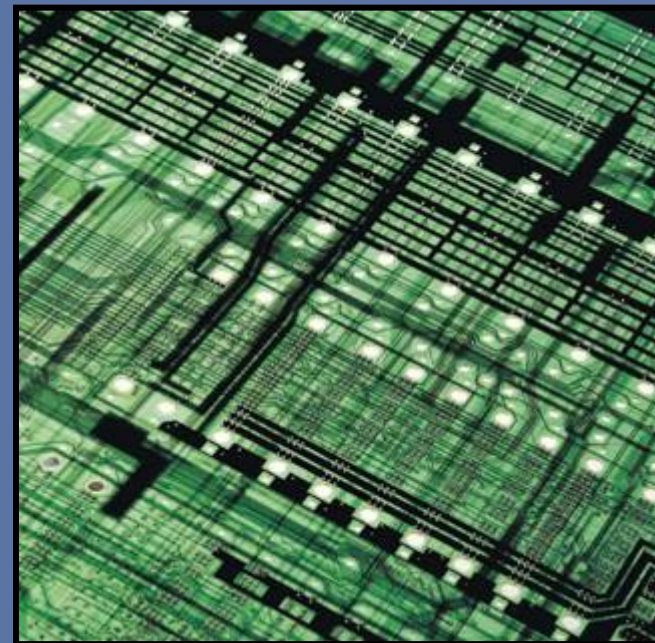
Sources : 11th Five-Years Plan, 2005;

<http://www.china.org.cn/english/2006lh/160403.htm>



Science and Technology

- Main goals of the 11th Five-Years Plan:
 1. Upgrading the overall hi-tech capability and technology level of the Chinese industries.
 2. Self-sufficient innovation.
 3. Further develop in the sector with value-added.



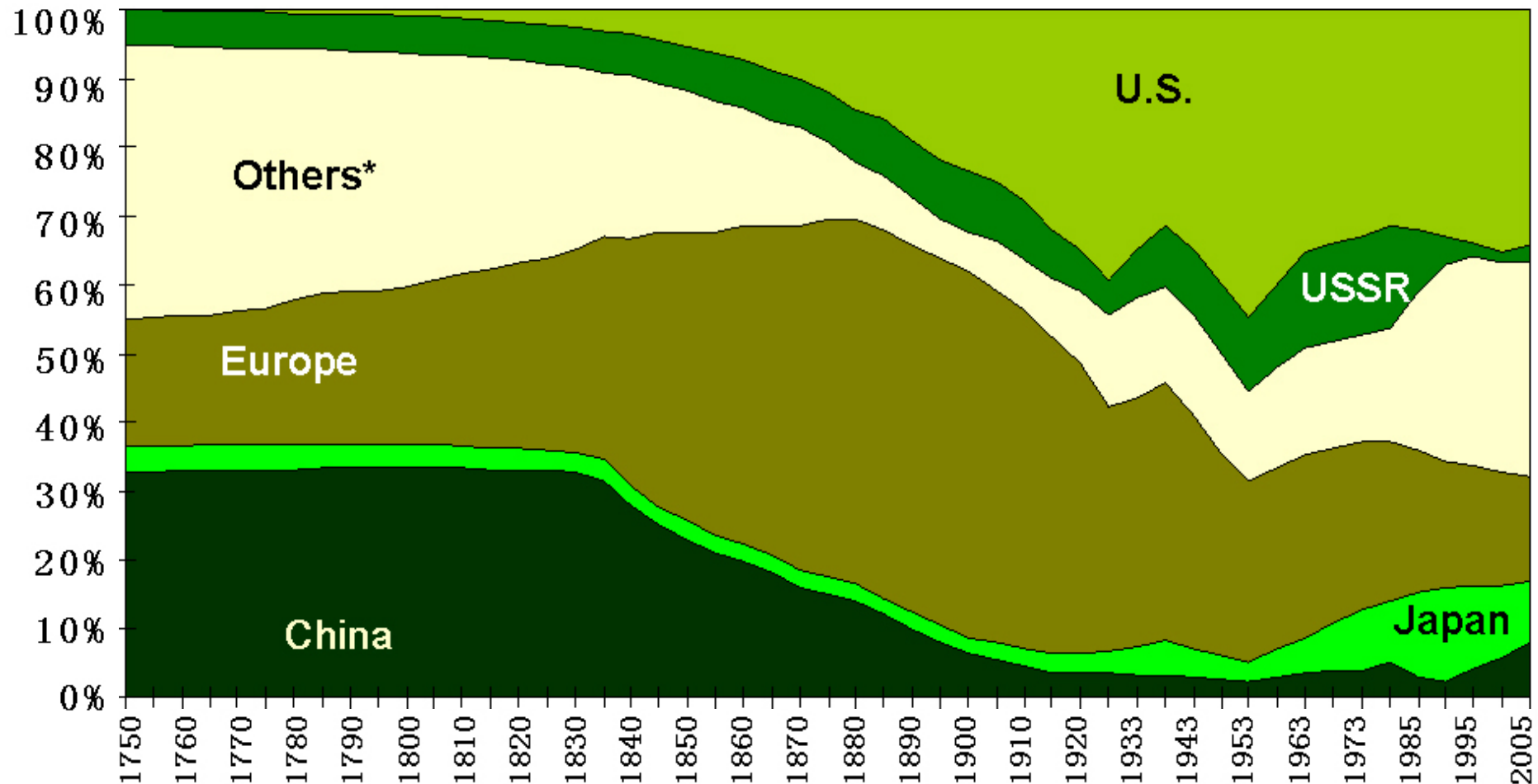


Intellectual Property Protection

Some Chinese firms are developing intellectual property (IP) that they want the [Chinese] government to protect. It has long been predicted that China would only start to enforce IP protection seriously when domestic pressure demanded it.



Shares of World Manufacturing Output 1750-2005



Data Sources : Paul Bairoch, "International Industrialization Levels from 1750-1890" *Journal of European Economic History* (Fall 1982); Samuel P. Huntington, "The Clash of Civilizations and the remaking of world order" (1993); "Manufacturing Value Added" from International Yearbook of Industrial Statistics, United Nations Industrial Development Organization 1980-2006

* "Others" refer to countries including India, Brazil, Mexico, Pakistan, and all the remaining countries not shown independently



In a Flatter World

- ❑ *Know-how* is widely available and accessible.
- ❑ *Competition* comes from any corner of the world.
- ❑ It is even more important for each entity to develop its own *unique capability*.





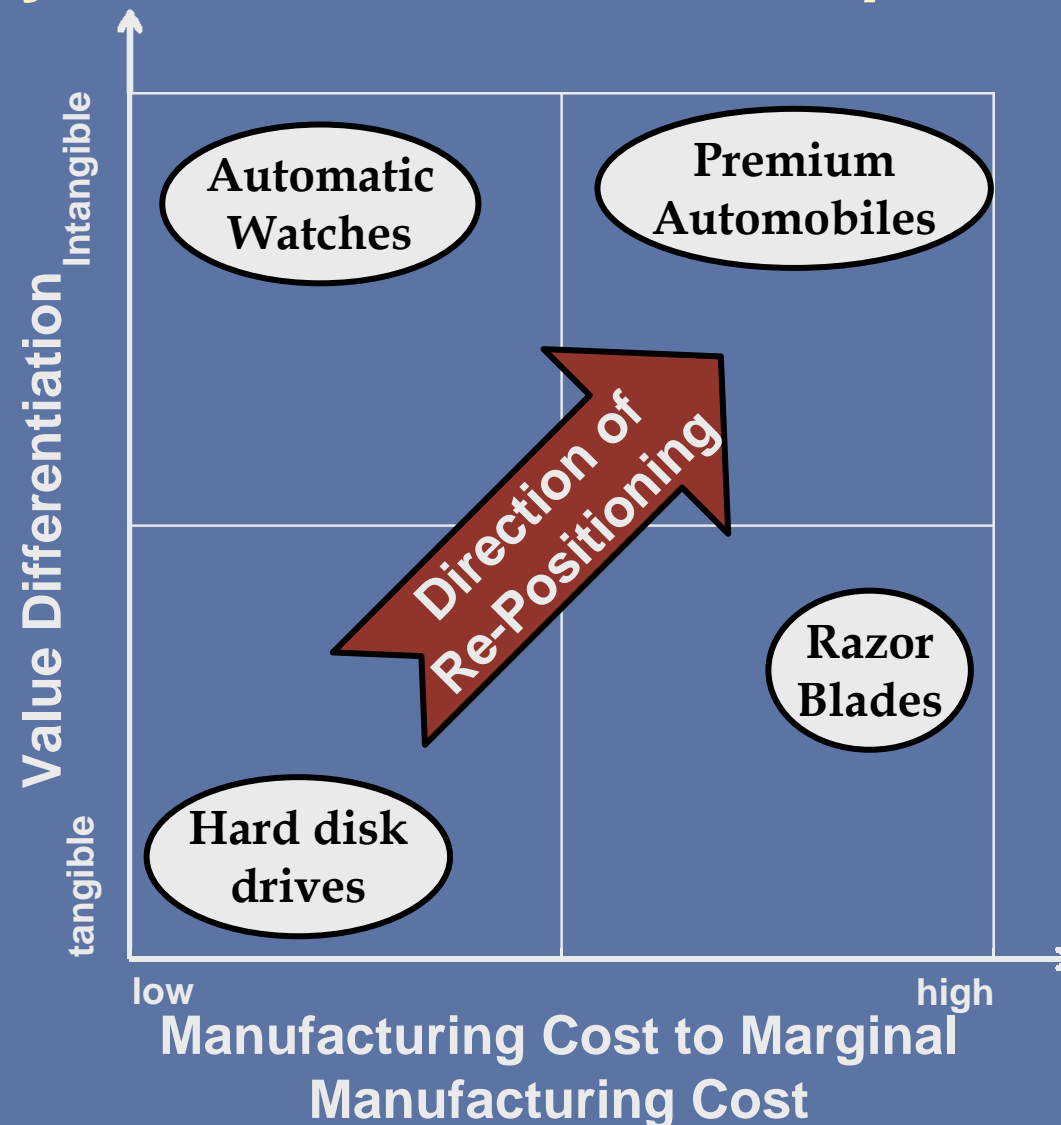
- How can the manufacturing industry of a developed economy compete with low labor cost economies?



The simple answer is:

There is no reason that you have to compete in same market with the same product with someone who has established low cost advantage!

The company will be better off to *re-position* itself.



More Products & Product Lines





Love Affair with Luxury

Men's wear : Armani
Suite : Cesare Attolini
Shirt : Luigi Borrelli
Tie : E. Marinella
Formal wear : Giorgio Armani
Casual wear : E. Zegna
Knitwear : Loro Piana
Pants : Giorgio Armani
Golf wear : Bobby Jones
Boating wear : Paul & Shark
Tennis wear : Lacoste
Women's wear : Galliano
Evening wear : Oscar de la Renta

By J.B.Twitchell

EMPORIO ARMANI
OCCHIALI

Cesare Attolini

E. MARINELLA
NAPOLI

GIORGIO ARMANI



Bobby Jones



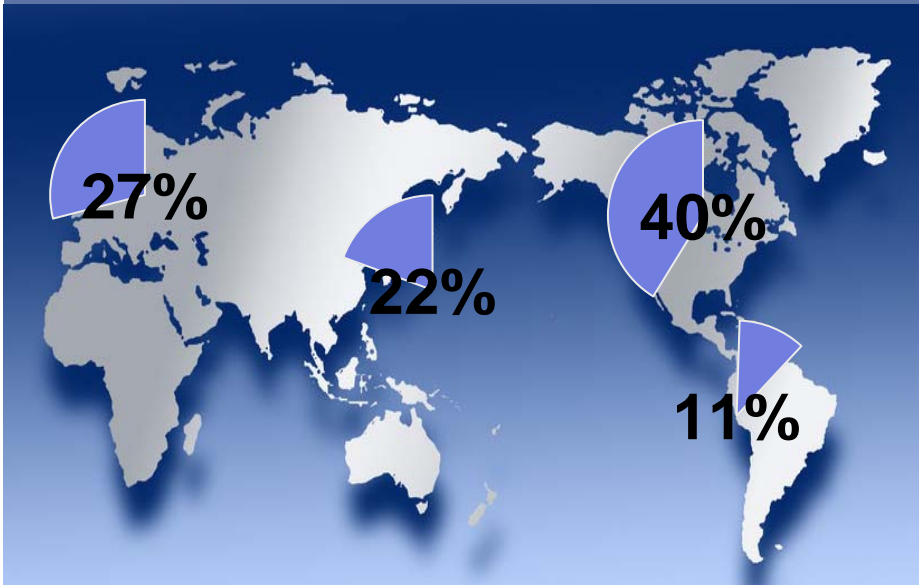
Galliano

Oscar de la Renta
PINK LABEL

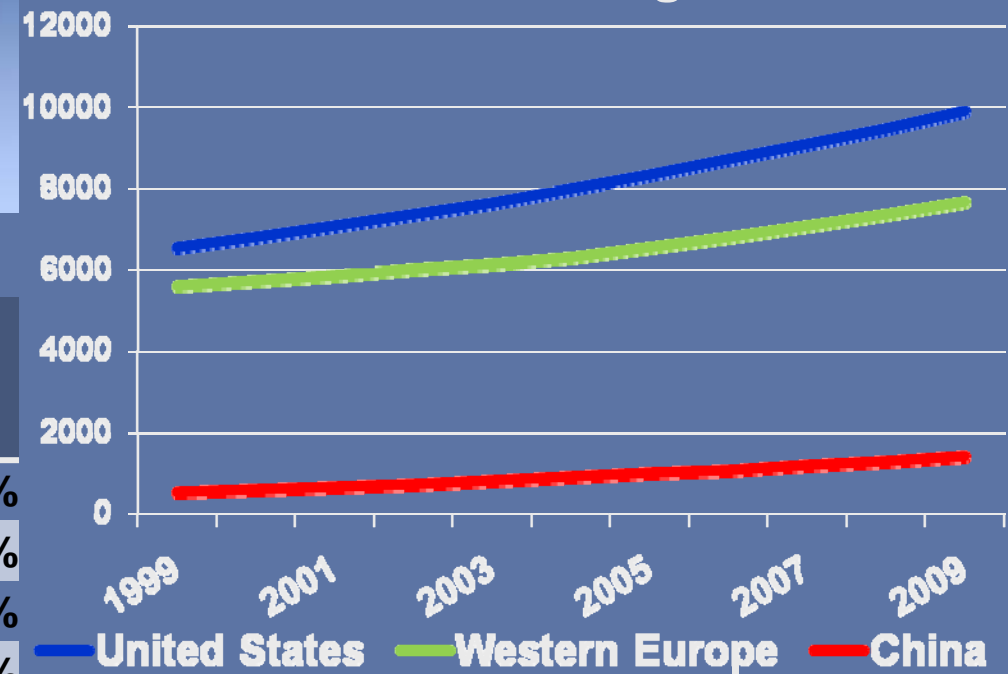
Cases in the Power Tools Industry



Power Tool Market Sales



Power Tools Sales by Selected Regions



| Country/Region | Average Annual Growth of PT Market | |
|----------------|------------------------------------|------------|
| | '99 to '04 | '04 to '09 |
| United States | 4,0% | 4,4% |
| Western Europe | 2,3% | 4,1% |
| China | 11,6% | 9,4% |
| World Total | 3,7% | 5,0% |



Make it in the Flat World



- ❑ Companies that successfully employ the capabilities of low cost countries flourish, deploy capabilities including
 - R&D
 - Engineering
 - Sourcing
 - Manufacturing
 - Assembly
- ❑ Companies that don't vanish.



□ Cases of Successful Transformations:

■ Hilti

- Turnover: €2,477.0 million
- Mid-sized enterprise, HQ in Liechtenstein
- Major production facilities in China
- Product Shipments to many other markets
- The company has been described as „an information network the just happens to sell tools“*.



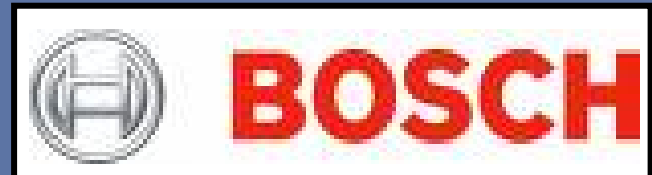
■ Einhell AG

- Turnover PT Div: €228.1 million
- Small German power tools company
- Production outsourced to China
- Design, sales, marketing, service mostly in Europe



■ Bosch

- Turnover PT Div.: €2,800 million
- Market leader
- Strong market growth through localization of manufacturing.
- Production of critical parts centralized



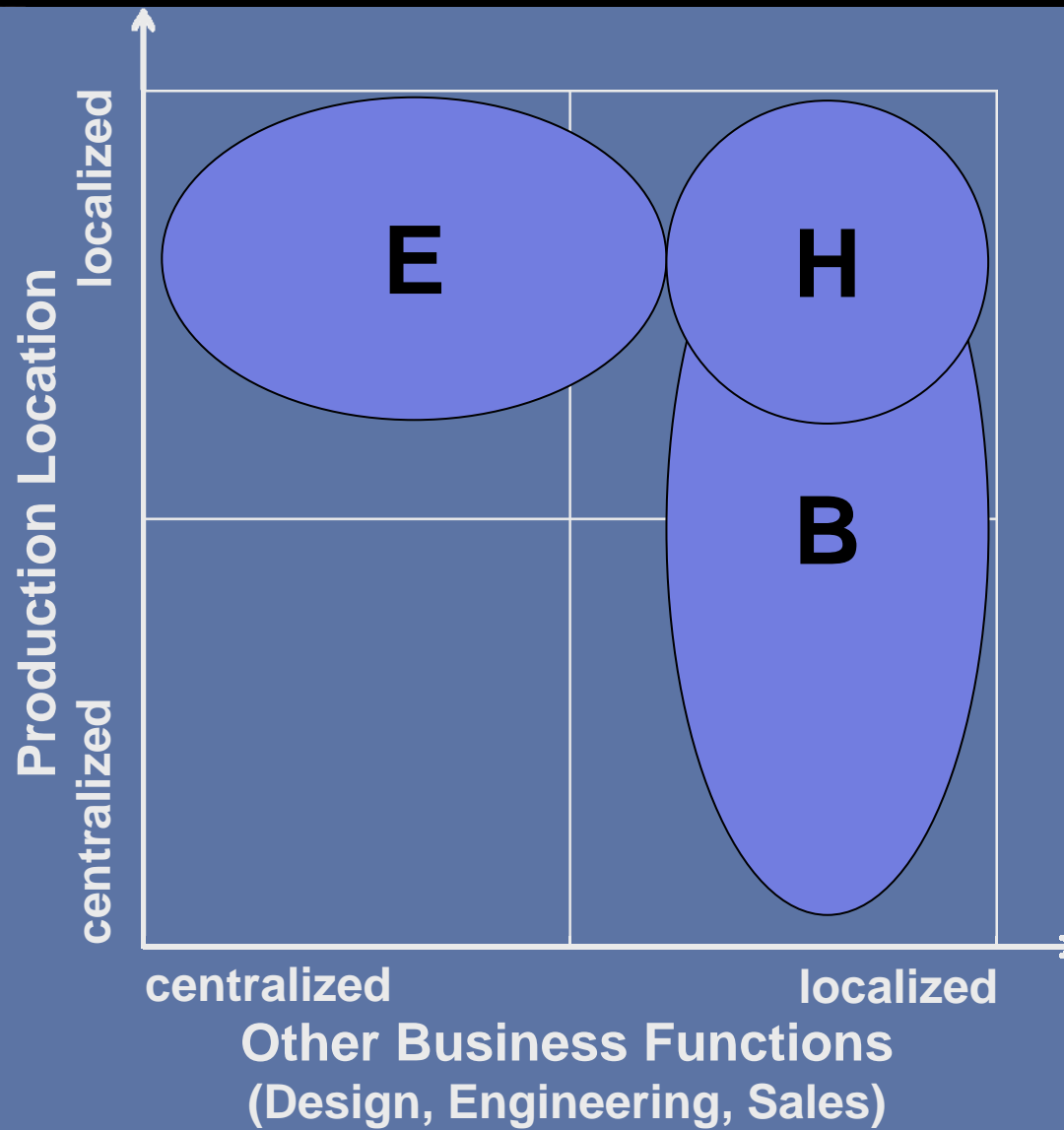
Sources: *Businessline*, Bosch eyes 40 pc in Indian power tools pie, Oct. 22nd 2004, pg.1;

Wei, J.; Bosch takes over China tool making sales, *China Daily*, Feb. 15th 2006, pg. 10;

* Dawar, N.; Vandenbosch, M.; Deriving value from customer relations, *Financial Times*. London (UK), Oct. 1st, 2004, pg. 2; 25

Annual company reports 2006, except Bosch: <http://www.werkzeugnews.de/news7/02-bosch-umsatz.html>

Cases in the Power Tools Industry





❑ Case of transition didn't work:



- Founded in 1883 in Germany
 - Since 1887 named: Allgemeine Electricitäts-Gesellschaft
- In 1996: Liquidation of AEG
 - AEG didn't differentiate its offer in time. Instead it was trying to become a conglomerate through leveraged acquisitions.
 - The company ceases to exist.
- Today: AEG Elektrowerkzeuge exists again as a power tool brand
 - The brand is owned by Techtronics Industries Ltd.
 - There are no AEG power tools manufacturing left in Germany



Globalization vs. Identity

A flatter world does not mean to give up one's culture and values, and one's individuality



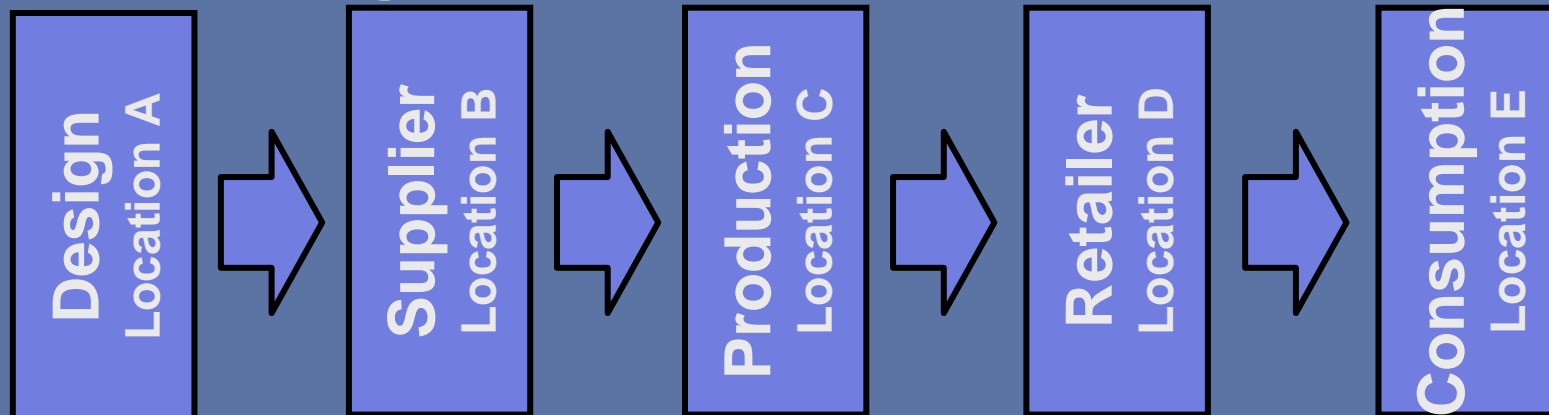
On the contrary, each entity, be it a country, region, or individual, needs to find its own valuable strength which clearly differentiates it from others.



Two options

□ Specialization

□ Value Integration and orchestration





Value Integration



Integrate the Value Chain, Not Just the Supply Chain

- ❑ Integrate manufacturing capabilities inside and outside
- ❑ Respond to the customer's needs not only in manufacturing, but also styles, brand etc.
- ❑ Adapt to the local capability in every node of value chain

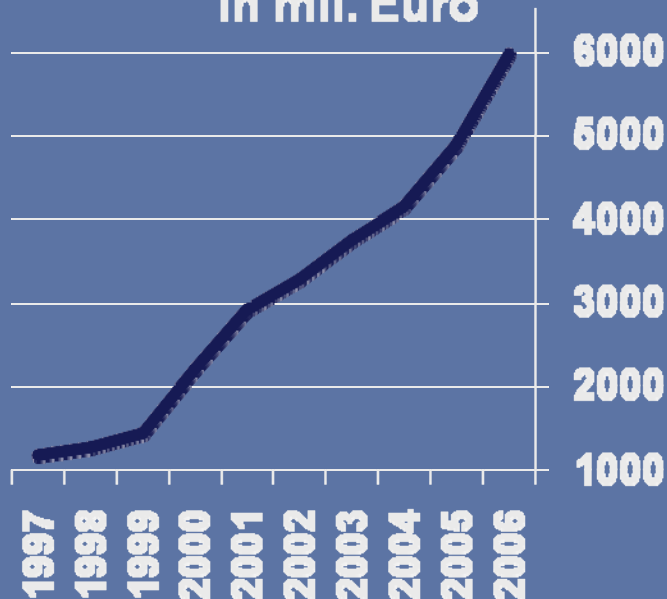
Li & Fung Group, Hong Kong



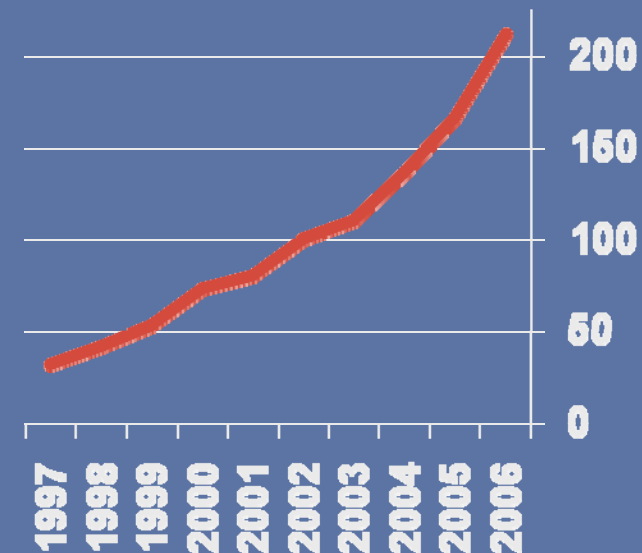
□ Corporate Numbers 2006:

- Turnover: 5,959.5 mil. € +22%
- Operating Profit: 205.4 mil. € +23%
- Compound annual growth rate
(from 1992 to 2006) : +22% p.a.

**Turnover
in mil. Euro**



**Operating Profit
in mil. Euro**





Li & Fung Group, Hong Kong



□ Evolving Business Model:

- Founded as a traditional *trader* of Chinese export goods
- *Sourcing partner*
- Since then *acquisition of sourcing operations* of several other companies
- Extend the value chain to brands

□ Key characteristics:

- Manufacturing without factories
- Using IT and IP applications as an enabler of supply chains
- Portfolio of suppliers with a factory network before customer orders come in



先進製造研究所
Advanced
Manufacturing
Institute

香港科技大學
The Hong Kong
University of Science
and Technology



Bringing Sourcing Solutions from China to the World

[Home](#) • [Service](#) • [Products](#) • [About Us](#) • [Quality](#)

[Catalogue](#) • [Contact](#) • [Intranet](#)

March 9th, 2007



Full SCM service

Value proposition

Client benefits

Process

The PCH International Service Cycle

Since 1996 PCH has delivered in excess of 200 million components worldwide and has developed a seamless process from initial client requirements to successful delivery.

Supply Chain Management

Client orders are received and acknowledged promptly with an agreed shipment schedule. PCH manages the supplier relationship ensuring that all requirements and schedule are adhered to. PCH personnel visit newly qualified manufacturers during first builds to ensure that potential problems are avoided.

Point at each stage to take a tour through our process



Engagement



Evaluation



Pricing &
Sampling



Qualification



Supply Chain
Management



Consigned /
Hubbed Stock



Successful
Delivery



[Home](#) • [Service](#) • [Products](#) • [About Us](#) • [Quality](#)

[Catalogue](#) • [Contact](#) • [Intranet](#)

March 9th, 2007



[Specialized Factories](#)

[Clients](#)

[Case Study 1](#)

[Case Study 2](#)

[Case Study 3](#)

Finding the right component at the right price

PCH specializes in solving clients' problems by sourcing top quality components at the best possible price. PCH can source a wide range of components and assemblies, driven by client request.

The current product range includes:



A dedicated web space where clients can upload all of the data on a range of products including specifications and photos in a secure environment.

- Cable assemblies
- Connectors
- CD cases /sleeves
- Modem adaptors
- Motors
- Power cords
- Speakers
- Microphones
- Headphones
- Earbuds
- Power adaptors
- Power supplies
- Transformers
- Batteries
- PCB's
- Flex Circuits
- Kitting
- Die cast assemblies
- Heatsinks



先進製造研究所
Advanced
Manufacturing
Institute

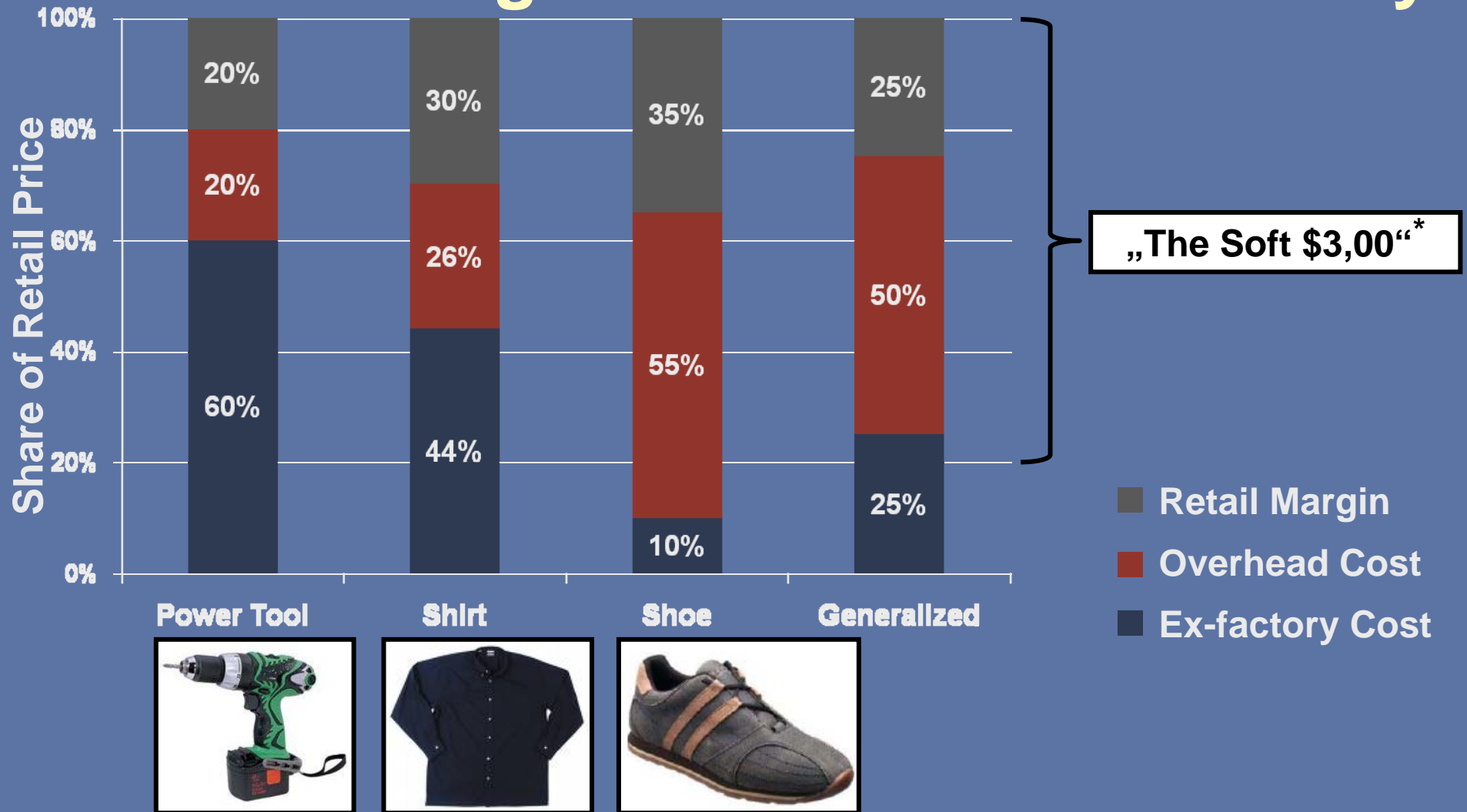


香港科技大學
The Hong Kong
University of Science
and Technology



7 Observations of Value Integration

Reducing costs *outside* the factory



Sources: Data based on: ETH Zürich, Retailer interviews (1996), Sanders; Analysis: *McKinsey-Quarterly*;

* Fung, V. K., et al., *Competing in a Flat World*, 2007



Scope Elevation

- ❑ Elevate beyond design and manufacturing, value is in the customers' **total experience**
- ❑ Concurrent engineering to link marketing and sales
 - For example, turning sourcing into sales and marketing.
 - By manufacturing in the market, you better understand the workings of the local market.



Democratization

- ❑ **Workers, particularly knowledge workers**
 - More responsibility
 - More knowledge and skill
- ❑ **Supply chain members**
 - Leverage on their expertise and point of view
 - Sources of new ideas for improvement
- ❑ **Innovation***
 - User centered innovation



Soft Asset

- ❑ **Traditional emphasis: Physical asset**
Companies compete based on their size.
 - E.g. General Motors, Siemens Mobile/Benq,...
 - **Consequences:**
 - Loss of agility and options
 - Loss of focus on customer's needs
- ❑ **Tomorrow: Soft Asset**
 - Capability,
 - Network
 - Image, branding
 - Good will



Customer Centric

- Externally: We have a flatter world.
- Internally: IT, reliable business process overcome internal barriers

- Earlier: Worry about internal control and work around the barriers
 - Customers often become afterthought
- Now: We can re-design the business with new systems and procedures that focus on serving customers better.

Customization and personalization....

Transparency





Transparency

- Increasing expectation from customers and society at large on
 - Quality
 - Social responsibility
 - Child labor
 - Environment
 - Compliance
 - Corruption
 - Corporate Image
 - Etc....



Loosely Coupled Supply Chain

- ❑ Traditional control, and cost cutting may not work
- ❑ Responsibility without authority outside of corporation
- ❑ Different sets of norm in different culture



7 Observations

1. Cost outside of factory
2. Scope elevation
3. Democratization
4. Soft Asset
5. Customer Centric
6. Transparency
7. Loosely coupled supply chain



New Sets of Expertise

Today: Production processes, machine shop education, ICT applications and shop floor management still dominates some of the manufacturing education curriculum, but different sets of skill requirement emerge:

- “Network Orchestration”*
- Strategic partnership Capabilities
- Negotiation skill
- Value chain design
- Remote project management
- Team work with people of different culture

*Fung, V. K., et al., Competing in a Flat World, 2007

12th Anniversary Celebration

Stanford-HKUS

Joint Teaching *Innovation*
Global Manufacturing

-TUEindhoven





先進製造研究所
Advanced
Manufacturing
Institute



香港科技大學
The Hong Kong
University of Science
and Technology



Exchange Programs

W

O

R

L

D



ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

AALBORG UNIVERSITET

Leibniz
Universität Hannover



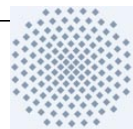
UNIVERSITY
OF TAMPERE



清華大學
Tsinghua University



上海交通大學
Shanghai Jiao Tong University



Universität Stuttgart



ECOLE DES MINES DE NANTES



HKUST



Universität Karlsruhe (TH)
Forschungsuniversität • gegründet 1825



TECHNISCHE
UNIVERSITÄT
MÜNCHEN



Institut
Arbeitswirtschaft und
Organisation



Instituto
de Empresa
Business School

TU/e

technische universiteit eindhoven



INSTITUT FRANÇAIS DE MÉCANIQUE AVANCÉE



Building a Body of Knowledge on Global Manufacturing

- ❑ Since 1996, 600 students with new skill through a joint course with real global industrial projects in three universities (Stanford, TU Eindhoven and HKUST) across three continents
- ❑ Over 100 students from 20+ universities/institutions participate in research exchange programs
- ❑ Graduates are better equipped to help companies manage their global business

Transformation Through Global Value Chains

Taking Advantage of Business Synergies in the United States and China



Behnam N. Tabrizi • Mitchell M. Tseng



MANUFUTURE'2007

**Constructing a Sustainably
Competitive Europe**



Dr. Mitchell M. Tseng
Chair Professor and Director
Advanced Manufacturing Institute
Hong Kong University of Science and Technology
Tseng@UST.HK
<http://ami.ust.hk/>