Deloitte.

The Manufacturing Competitiveness Imperative for the United States of America

The Woodrow Wilson International Center for Scholars

July 31, 2012

Craig A. Giffi
Vice Chairman
U.S. Leader, Consumer & Industrial Products

The Manufacturing Competitiveness Imperative

1. Our Research Background to Discuss Manufacturing Competitiveness
2. What Defines a Country's Competitiveness?
3. Which Countries Are The Most Competitive?
4. What Trends Are Shaping Competitiveness In The Future

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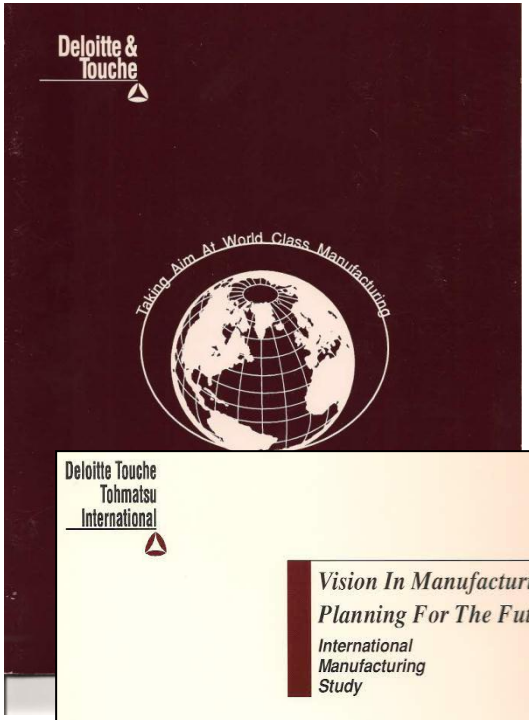
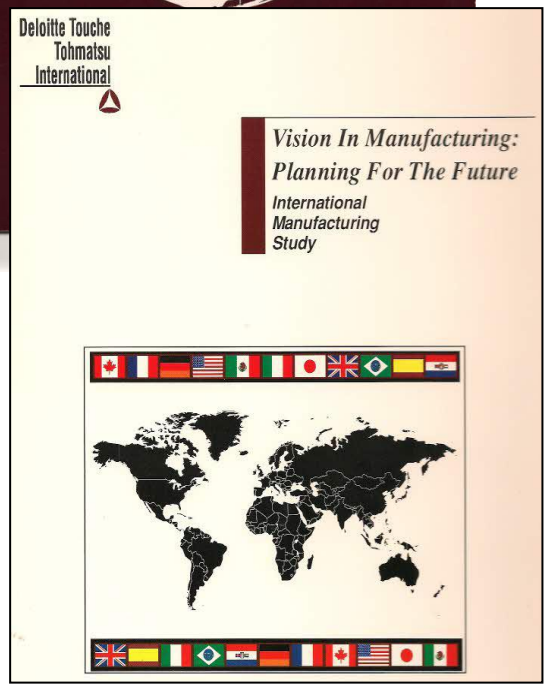
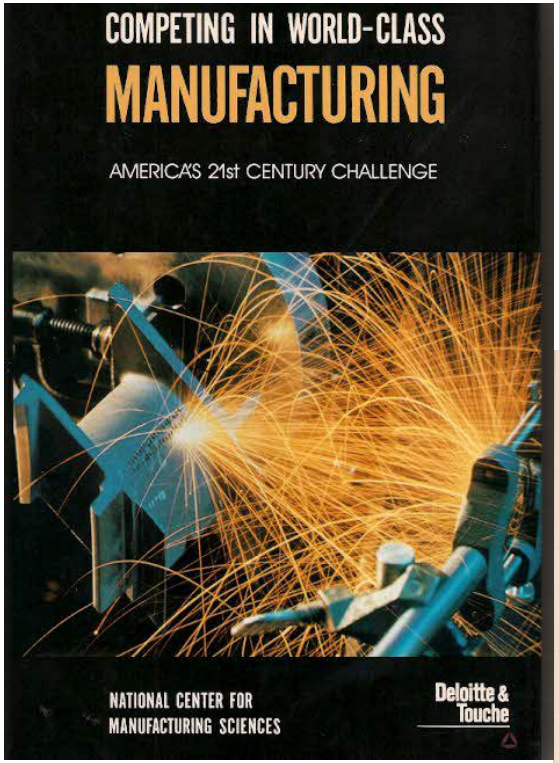
Our manufacturing research collaboration goes back over 25 years……..

1987-1988

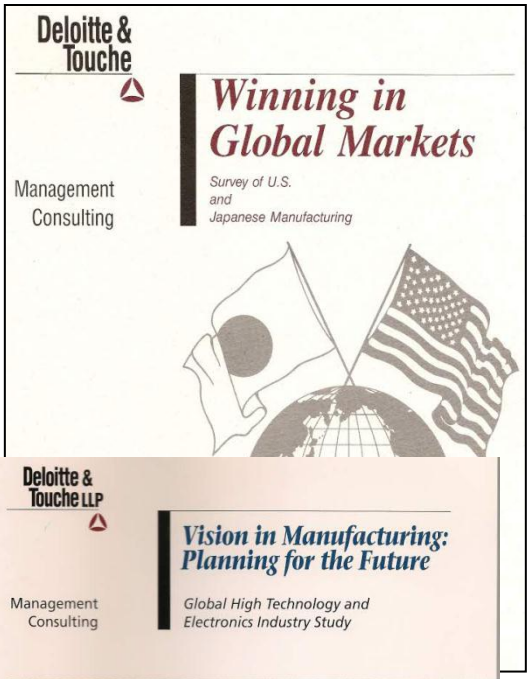


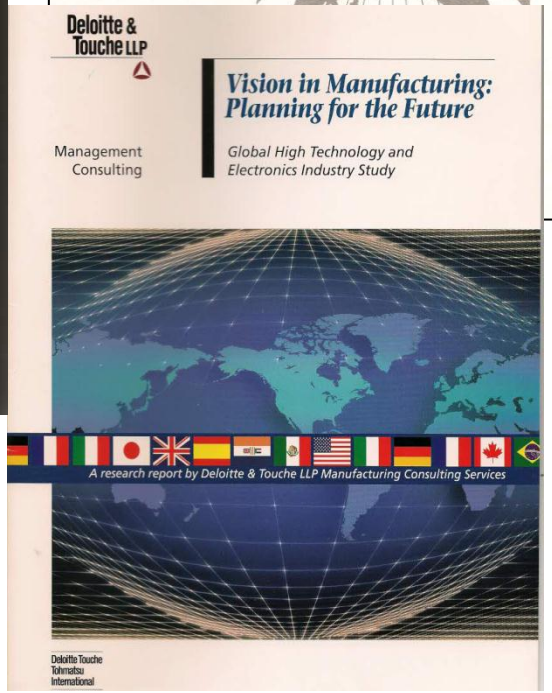


1989-1990



1991-1992





1992-1993

1994-1997

Collaboration with the Council on Competitiveness

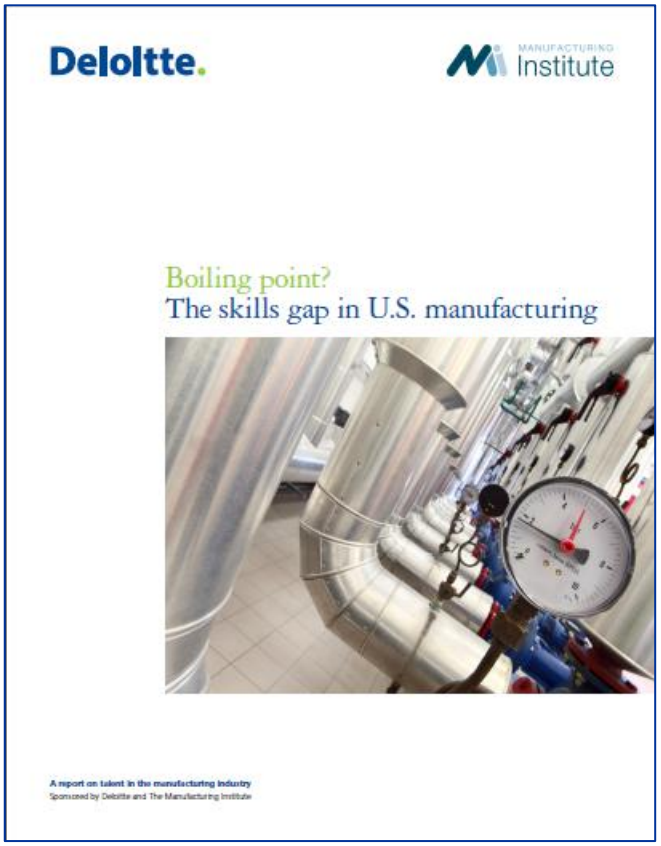
Collaboration with the Manufacturing Institute

2011

2010

2009

2011

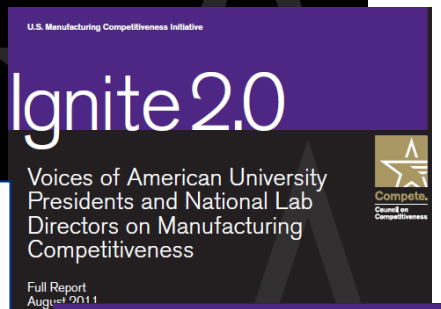


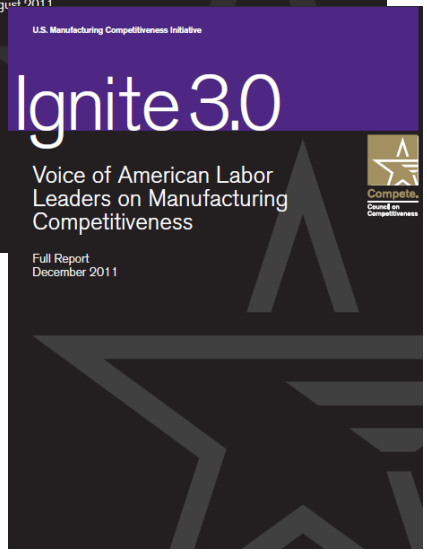
Collaboration with the World Economic Forum

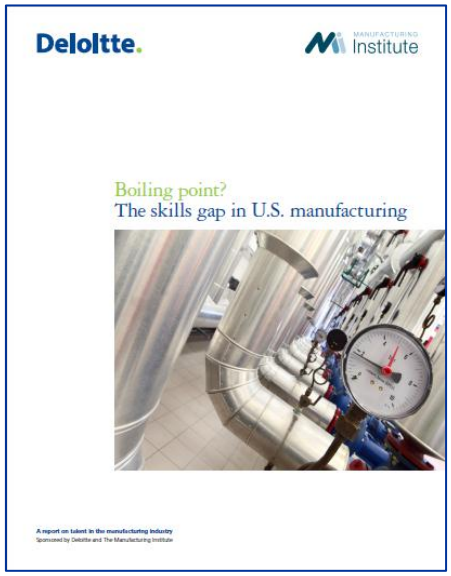
Davos 2012

Davos 2013

So what does all this research tell us?







The Future of Manufacturing Project - Acknowledgements

The Future of Manufacturing project represents collaboration with senior manufacturing executives, policymakers, and subject matter experts

Task Force and GAC on Advanced Manufacturing

EMBRAER
BOMBARDIER
Planning Commission Government of India
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VERITÉ
Mahindra Satyam
RENAULT NISSAN
Honeywell
DOW
Bharat Forge
UPS
BNDES
lenovo
Braskem
SYSTEM CAPITAL MANAGEMENT
Mahindra
Brightstar
RENAULT
OECD
JOINT INSTITUTE UM-SJTU
HOFSTRA UNIVERSITY
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CLEMSON UNIVERSITY
DIVISION OF ECONOMICS & BUSINESS COLORADO SCHOOL OF MINES

The Manufacturing Competitiveness Imperative

1. Our Research Background to Discuss Manufacturing Competitiveness
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Does Manufacturing Still Matter? The Answer: YES!

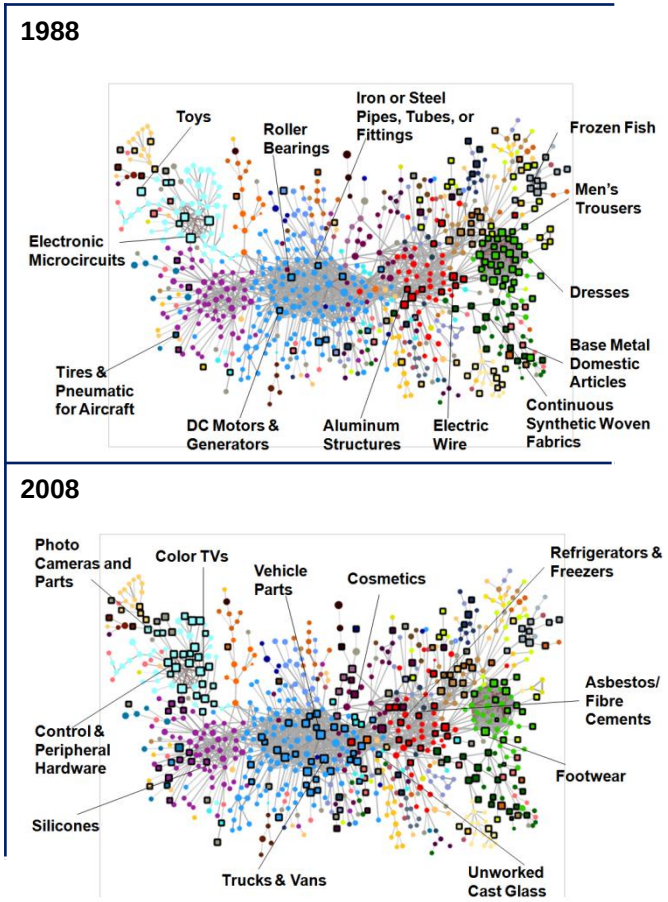
Economic Complexity and the Future of Manufacturing

Does manufacturing still matter?? Ricardo Hausmann's and César Hidalgo's research seems to convincingly answer the question: ***Yes!***

Their work has numerous implications in the context of manufacturing and the linkage to economic growth:

- ***The advancement of manufacturing capabilities is directly linked to increasing economic prosperity for a nation*** and its' citizens; proper positioning and movement within the '***product space***' determines the ability to accelerate economic development.
- ***Many emerging economies are primed for rapid growth***, enabled by the complex economic infrastructures they have developed and the manufacturing knowledge and capabilities accumulated.
- ***Developed nations must also continue to advance their manufacturing capabilities and knowledge*** in order to innovate, create ever more sophisticated economies and to stay competitive.
- As nations and companies build more and more advanced manufacturing capabilities, ***strategic decisions will become more complex and carry more risk for both countries, from a policy perspective, and companies regarding everything*** from location decisions to joint venture partners and to sourcing and supply chain networks.
- ***The proverbial "bar" will continue to be set higher and higher*** as advanced manufacturing capabilities disseminate globally.

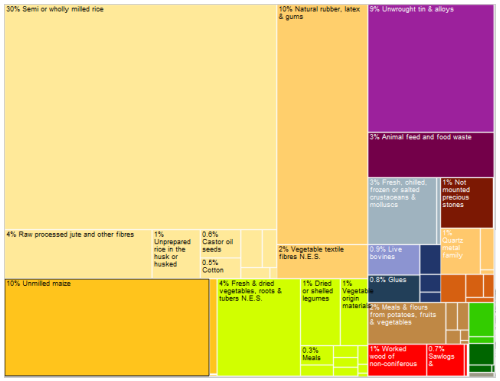
Thailand: 'Product Space' Maps



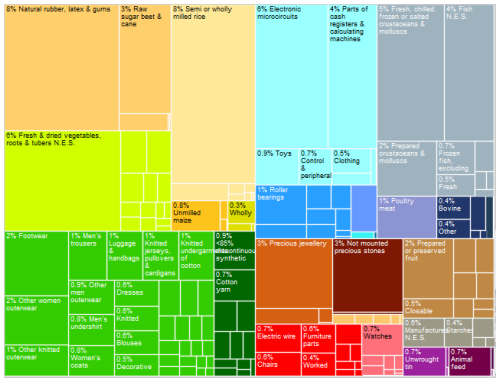
Source: *The Atlas of Economic Complexity*; Hausmann and Hidalgo, 2011

Case Study: Thailand from 1968 - 2008

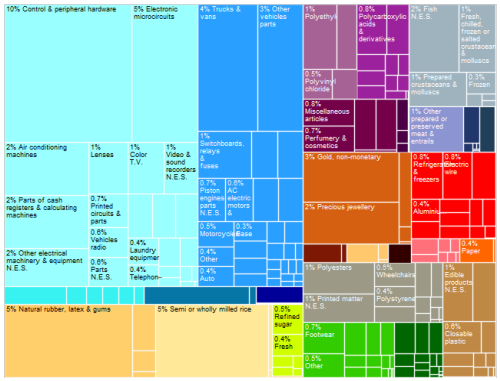
1968



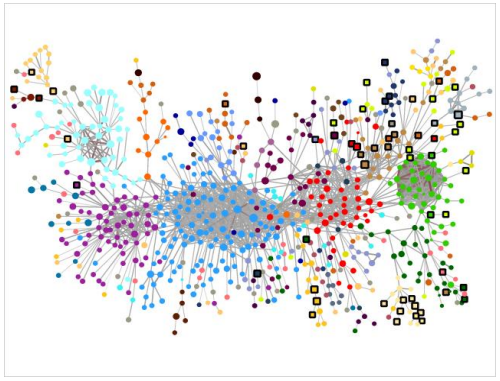
1988



2008

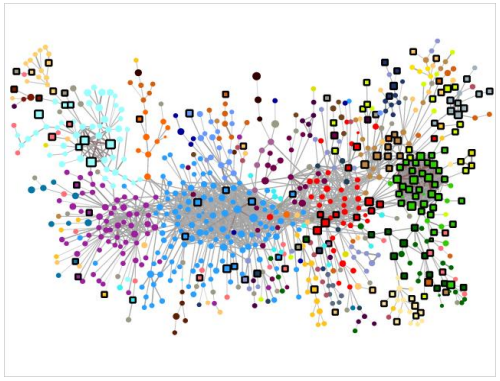


1968



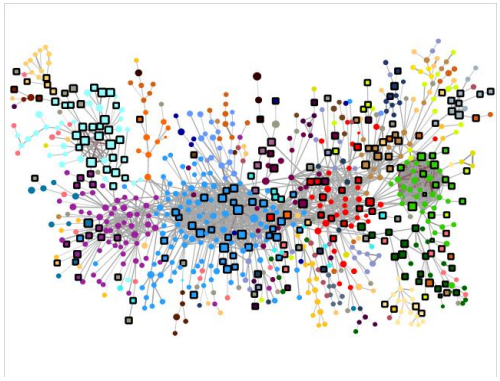
Metric	
ECI Index	-0.61
GDP / Capita	$175

1988



Metric	
ECI Index	0.09
GDP / Capita	$1,114

2008

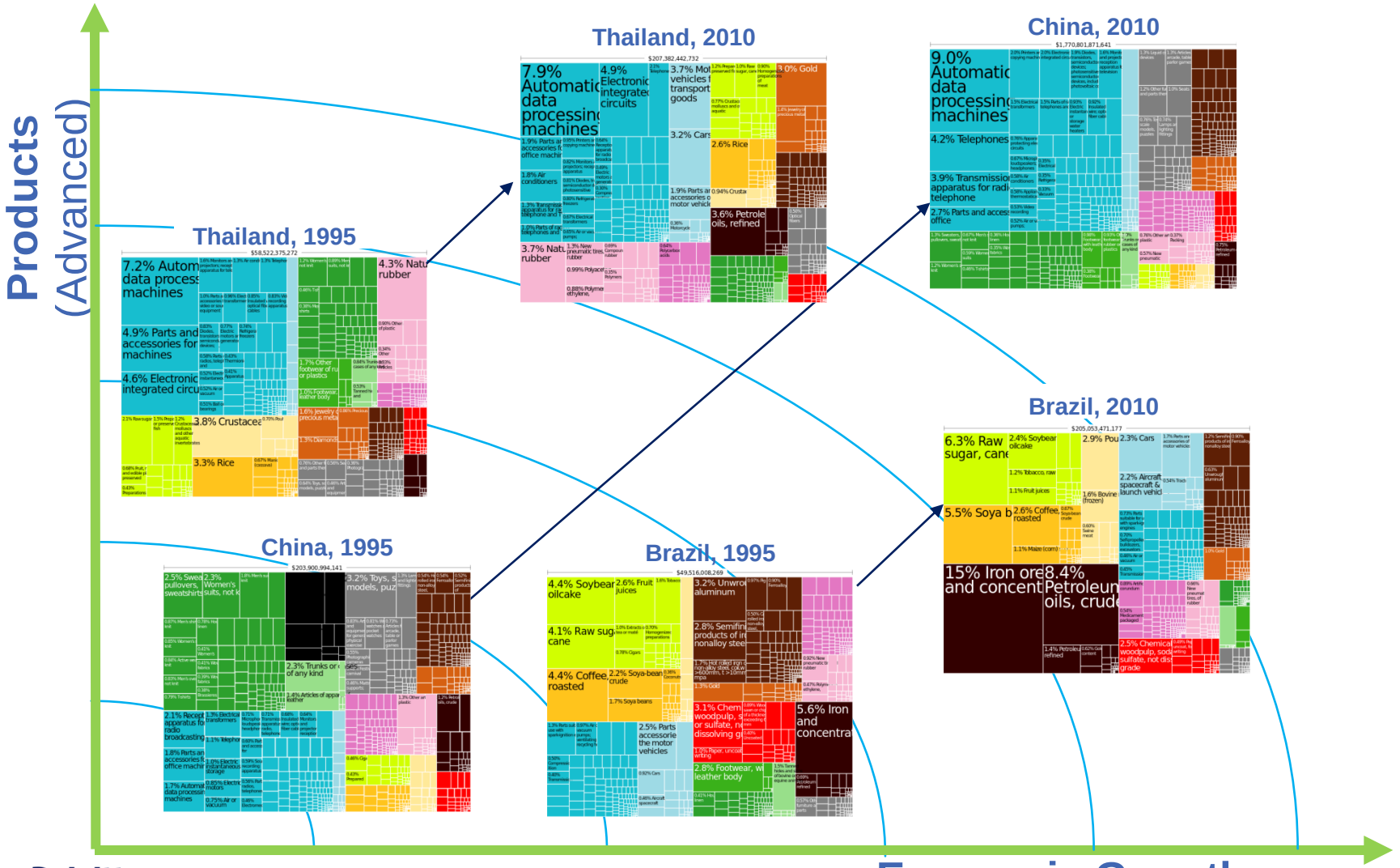


Metric	
ECI Index	0.81
GDP / Capita	$3,993

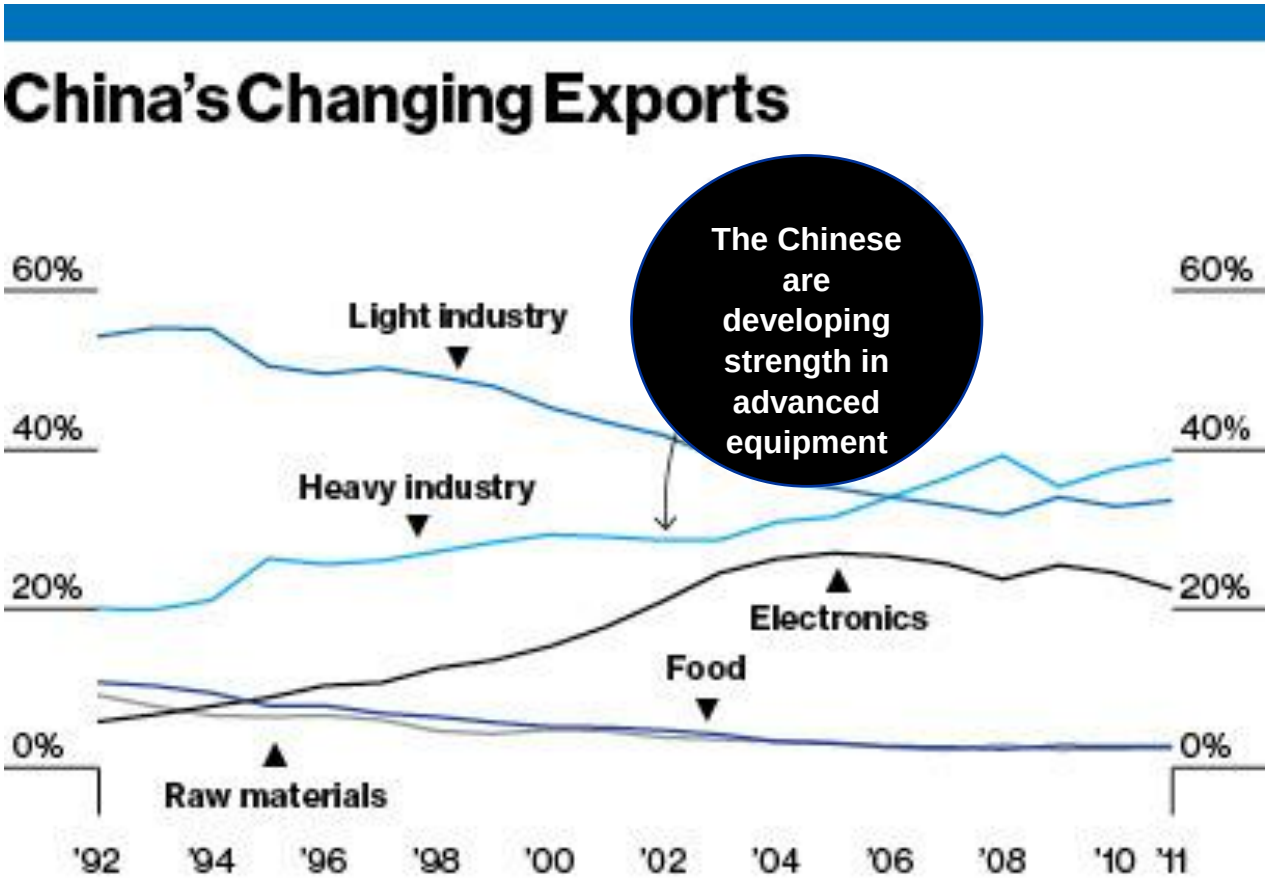
Source: The Atlas of Economic Complexity – Mapping Paths to Prosperity; Hausmann, Hidalgo, et al., 10/23/11; World Bank

Advanced Manufacturing as a Driver of Economic Prosperity

Emerging nations recognize the economic benefits derived from manufacturing. These nations have enjoyed economic growth as the products they produce have become more advanced



China's Steady Movement to Advanced Manufacturing



Economic Complexity and Ability to Advance Within Manufacturing Networks Defines Company and Country Success

Economic prosperity and global competitiveness will be defined by the relationship between advanced manufacturing capabilities and products that can be competitively exported

Implications for Countries

- The advancement of manufacturing capabilities is directly linked to increasing economic prosperity for a nation and its' citizens.
- Positioning within the product space determines the ability to accelerate the development of advanced manufacturing capabilities and products.
- Many developing nations are primed for rapid growth fueled by full utilization of capabilities; developed nations also need to continue to advance to stay competitive.

Implications for Companies

- As more countries develop advanced manufacturing capabilities, today's market leaders will be increasingly challenged by new competitors requiring investments in innovation and new markets to maintain/improve competitiveness
- Growth of advanced manufacturing hubs in developing countries opens the door to new locations for manufacturing and customers, but also the higher costs typically seen in complex economies.

Broader Implications

- Viewing existing capability sets through the "product space" lens can create a competitive advantage for companies and countries
- As nations and companies build more, and more advanced, manufacturing capabilities, strategic decisions will become more complex and carry more risk.
- The proverbial 'bar' will continue to be set higher and higher as capabilities disseminate globally

Development of advanced manufacturing capability sets and advanced products via careful selection of strategic pathways can lead to greater prosperity – for both countries and companies

Source: The Atlas of Economic Complexity – Mapping Paths to Prosperity; Hausmann, Hidalgo, et al., 10/23/11

2010 Global Manufacturing Competitiveness Index Report

Deloitte.

Compete. Council on Competitiveness

2010
Global Manufacturing Competitiveness Index

Table 3:

Current competitiveness

Rank	Country	Index score (10=High 1=Low)
1	China	10.00
2	India	8.15
3	Republic of Korea	6.79
4	United States of America	5.84
5	Brazil	5.41
		5.11
		4.84
		4.80
		4.69
		4.49
		4.38
		4.17
		4.11
		3.07
		3.07
		2.90
		2.82
		2.78
		2.67
		2.58
		2.42
		2.28
		1.70
		1.18
		1.03
26	Saudi Arabia	1.00

Source: Deloitte and US Council on Competitiveness - 2010 Global Manufacturing Competi

Competitiveness in 5 years

Rank	Country	Index score (10=High 1=Low)
1	China	10.00
2	India	9.01
3	Republic of Korea	6.53
4	Brazil	6.32
5	United States of America	5.38
6	Mexico	4.84
7	Japan	4.74
8	Germany	4.53
9	Poland	4.52
10	Thailand	4.35
11	Singapore	4.30

Table 1: Drivers of global manufacturing competitiveness

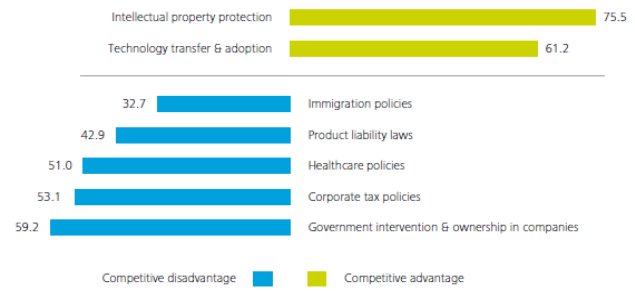
Rank	Drivers	Driver score (10=High 1=Low)
1	Talent - driven innovation	9.22
2	Cost of labor and materials	7.67
3	Energy cost and policies	7.31
4	Economic, trade, financial and tax systems	7.26
5	Quality of physical infrastructure	7.15
6	Government investments in manufacturing and innovation	6.62
7	Legal and regulatory system	6.48
8	Supplier network	5.91
9	Local business dynamics	4.01
10	Quality and availability of healthcare	1.81

Source: Deloitte and US Council on Competitiveness - 2010 Global Manufacturing Competitiveness Index; ©Deloitte Touche Tohmatsu, 2010.

Figure 2c: Policy advantages and disadvantages for U.S.

U.S. policy

(percent indicating advantage or disadvantage)



Neutral policies

- Infrastructure development
- Science technology and innovation
- Central bank & economic policies
- Anti-trust laws & regulations
- Economic development
- Sustainability policies
- Employee education & assistance
- Trade policies
- Safety & health regulations
- Environmental policies
- Energy policies
- Labor laws & regulations
- Foreign direct investment

Source: Deloitte and US Council on Competitiveness - 2010 Global Manufacturing Competitiveness Index; ©Deloitte Touche Tohmatsu, 2010.

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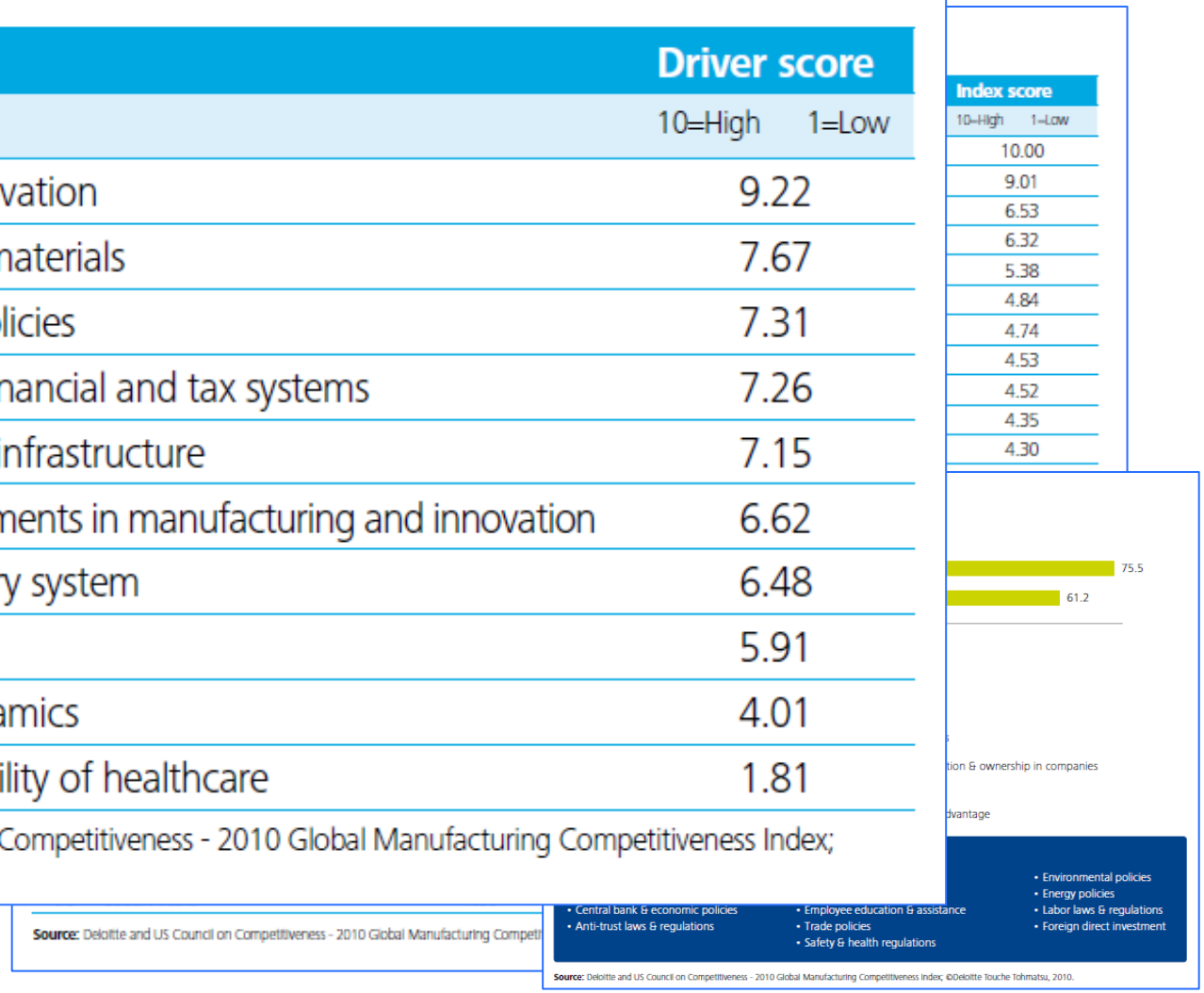

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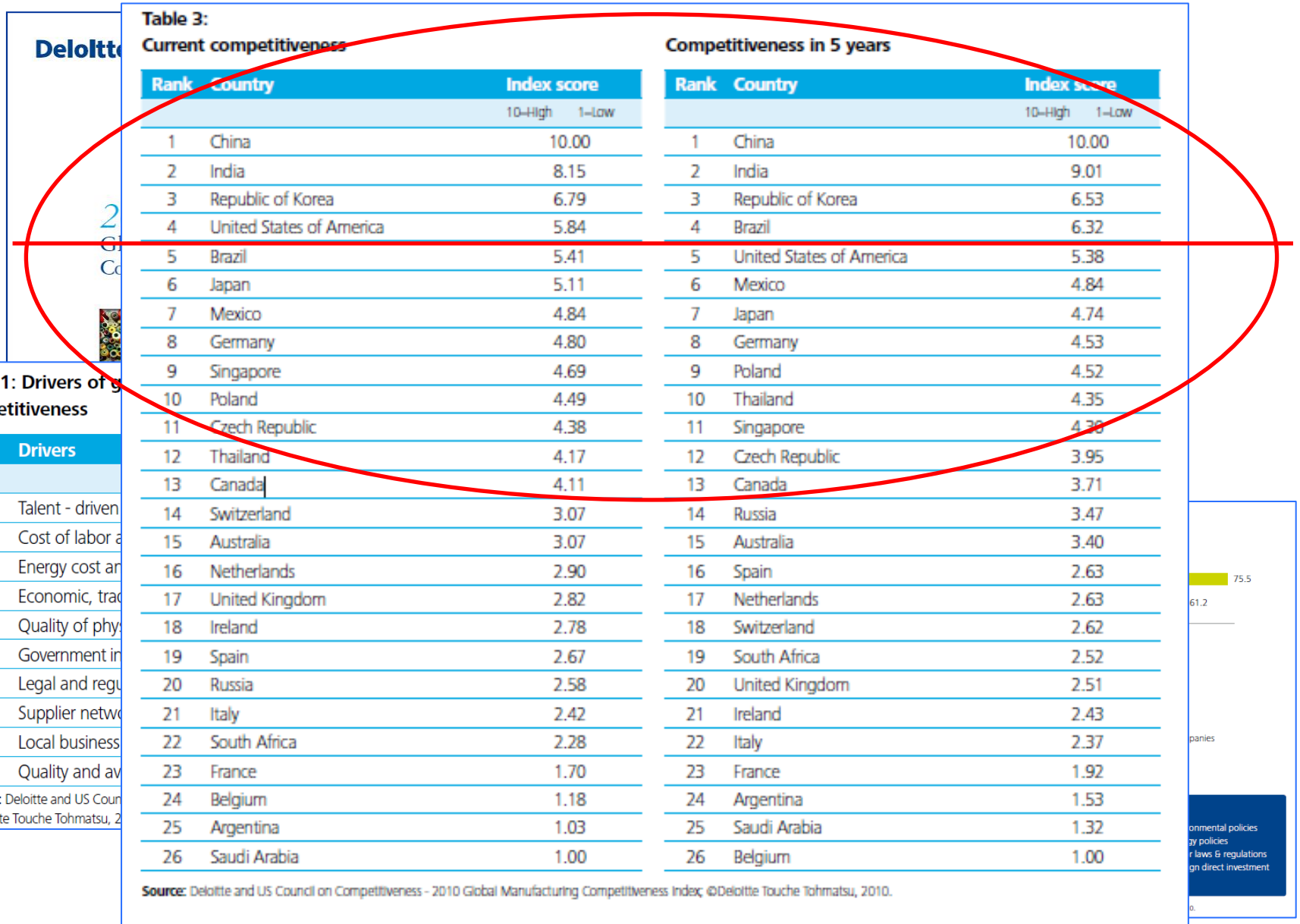

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12	Thailand	4.17
13	Canada	4.11
14	Switzerland	3.07
15	Australia	3.07
16	Netherlands	2.90
17	United Kingdom	2.82
18	Ireland	2.78
19	Spain	2.67
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21	Italy	2.42
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Competitiveness in 5 years

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8	Germany	4.53
9	Poland	4.52
10	Thailand	4.35
11	Singapore	4.30
12	Czech Republic	3.95
13	Canada	3.71
14	Russia	3.47
15	Australia	3.40
16	Spain	2.63
17	Netherlands	2.63
18	Switzerland	2.62
19	South Africa	2.52
20	United Kingdom	2.51
21	Ireland	2.43
22	Italy	2.37
23	France	1.92
24	Argentina	1.53
25	Saudi Arabia	1.32
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Source: Deloitte and US Council on Competitiveness - 2010 Global Manufacturing Competitiveness Index; ©Deloitte Touche Tohmatsu, 2010.

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Rank	Drivers
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5	Quality of phys
6	Government in
7	Legal and regu
8	Supplier netwo
9	Local business
10	Quality and av

Source: Deloitte and US Coun… ©Deloitte Touche Tohmatsu, 2…

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Manufacturing's Globalization

Over the past 20 years, rapid globalization has occurred and the global manufacturing eco-system has experienced more change, impacting the prosperity of more companies, nations and people than at any time since the Industrial Revolution.

Free Trade Proliferation

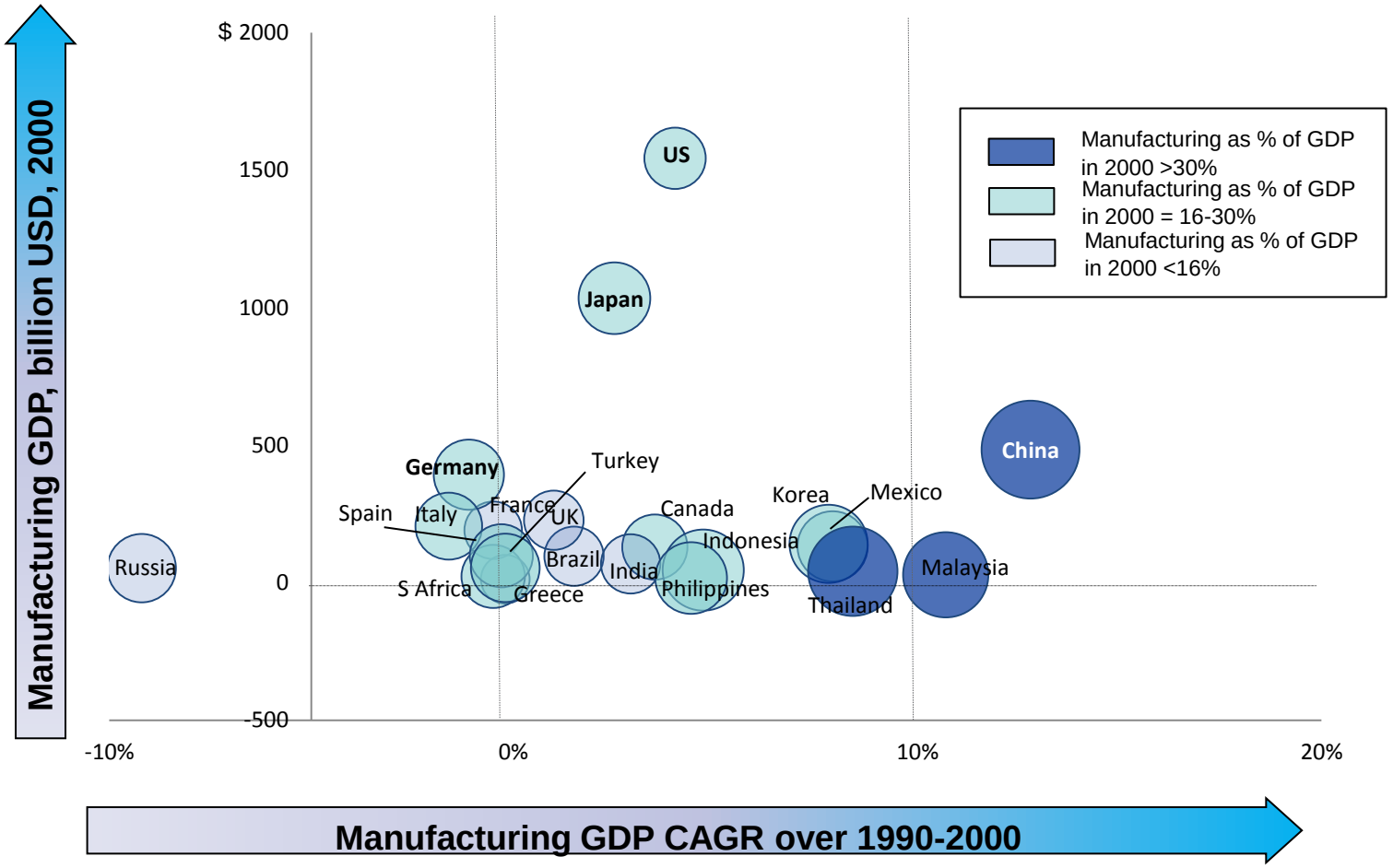
Digital Technology Infrastructures

The Rise of a New Global Middle Class

Global Disaggregation of Manufacturing Supply Chains

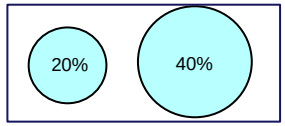
Rapid globalization has changed the economic fabric of the world, and manufacturing supply chains, in profound and significant ways

Manufacturing's Globalization 1990 to 2000



Size of the bubbles represent Manufacturing as % of GDP in 2000

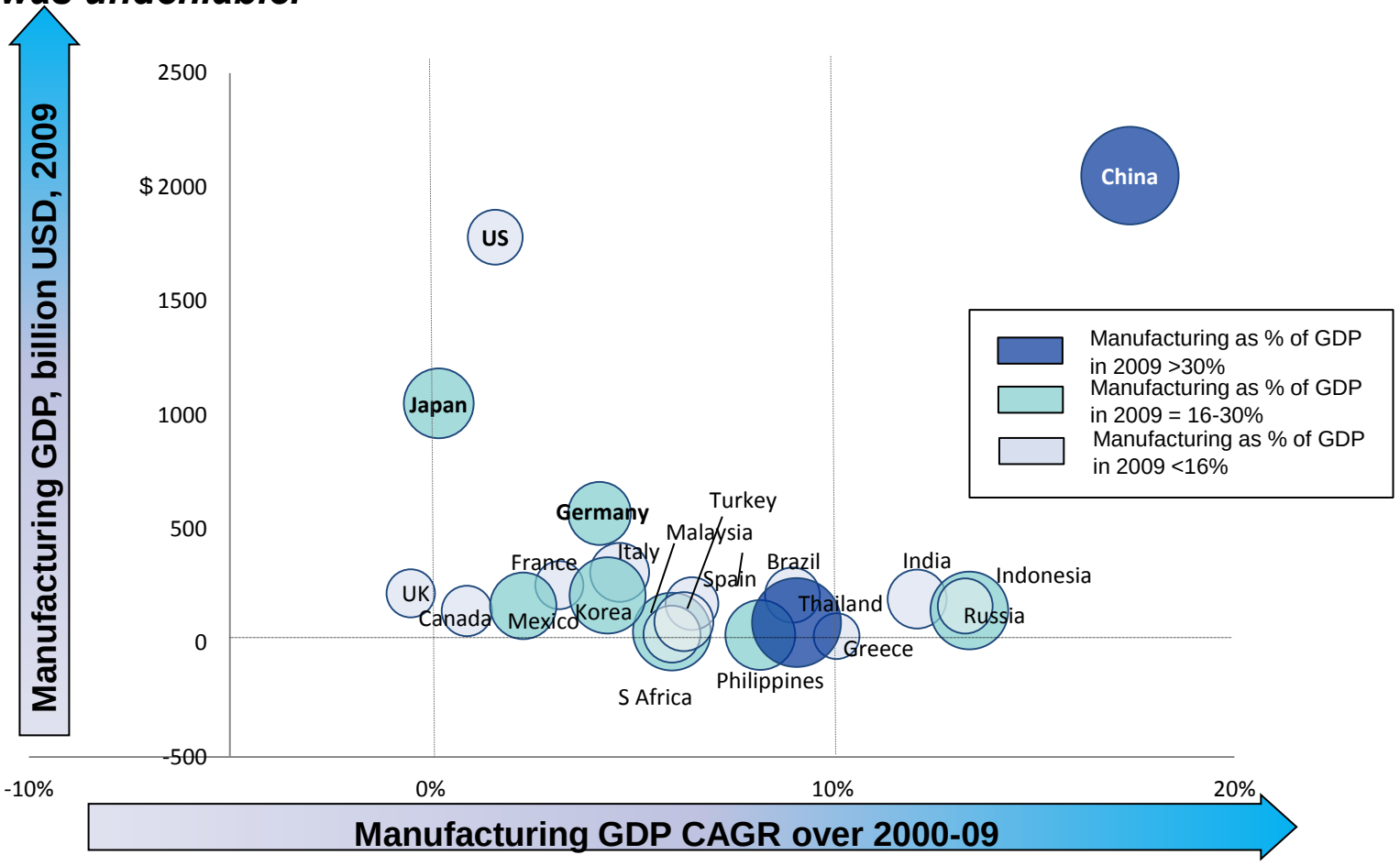
Key:



Source: UNCTAD STAT data accessed on December 7, 2011;
World Bank

Manufacturing's Globalization 2000 to 2009

"While the decade of the 90s revealed something significant was underway, by 2009 manufacturing's globalization, and its ability to be an engine for growth for emerging economies, was undeniable."

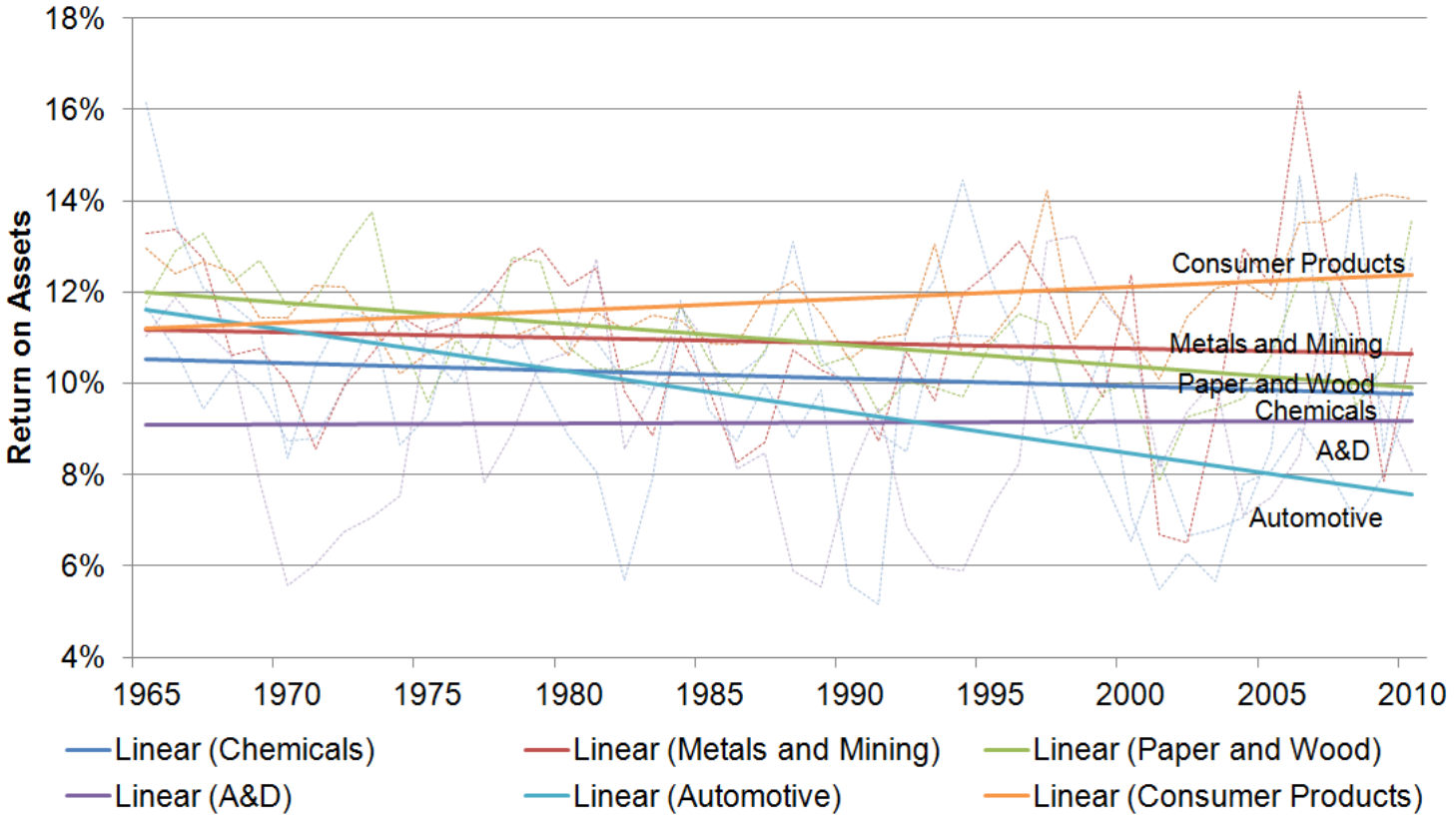


Source: UNCTAD STAT data accessed on December 7, 2011; World Bank

Forces of globalization are increasing pressure on manufacturing sectors in developed economies.

Even top-quartile performers in the U.S. have struggled to make significant ROA gains over the past 45 years; as the largest manufacturing economy in the developed world, the U.S. is a leading indicator for other developed economies around the globe.

ROA Performance trends for Top Quartile of U.S. Manufacturing sectors (1965 – 2010)

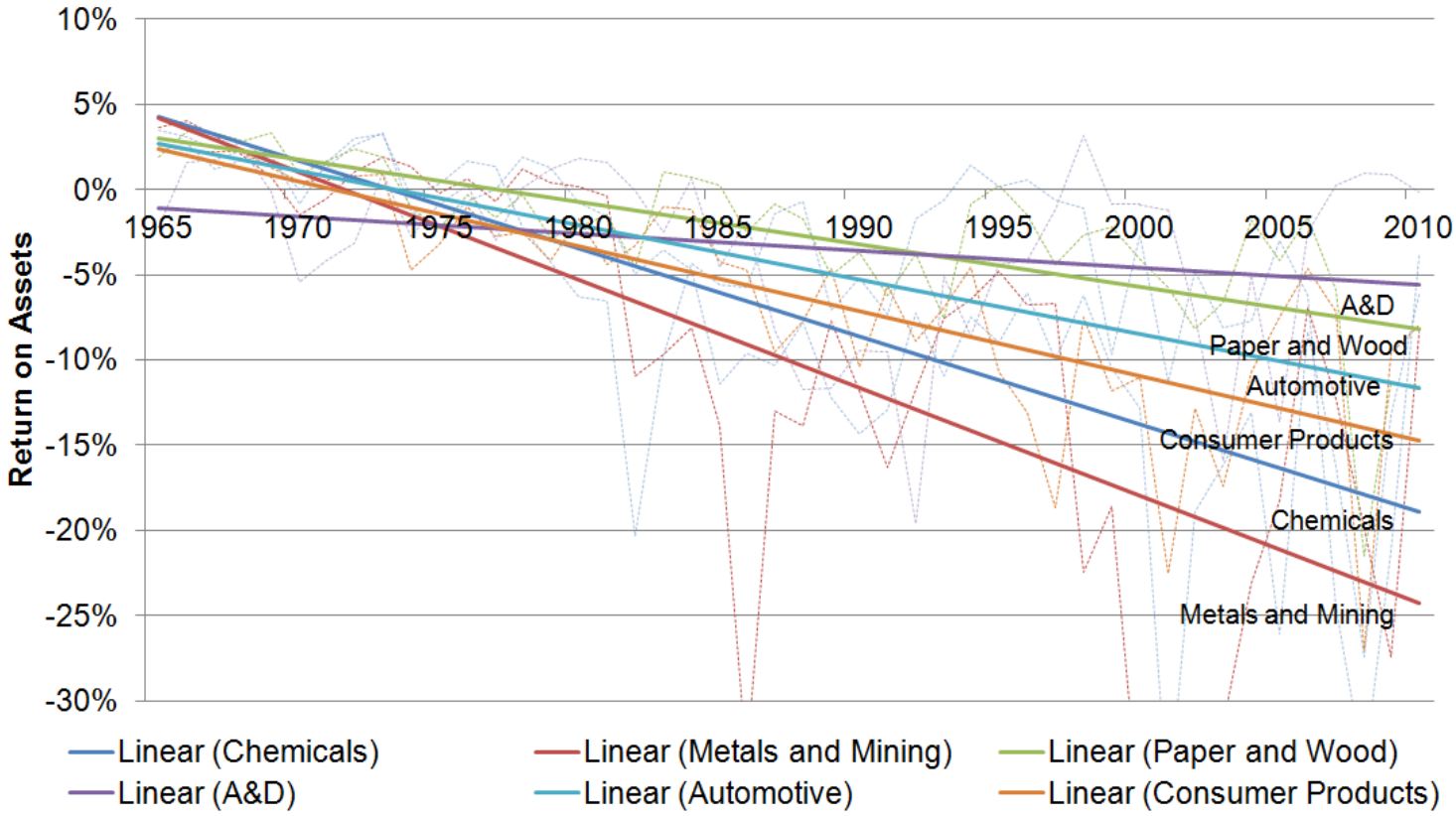


Source: Deloitte analysis

Winners are barely holding on, while bottom quartile companies have rapidly deteriorating performance.

There is also a growing distance between winners and losers in each sector.

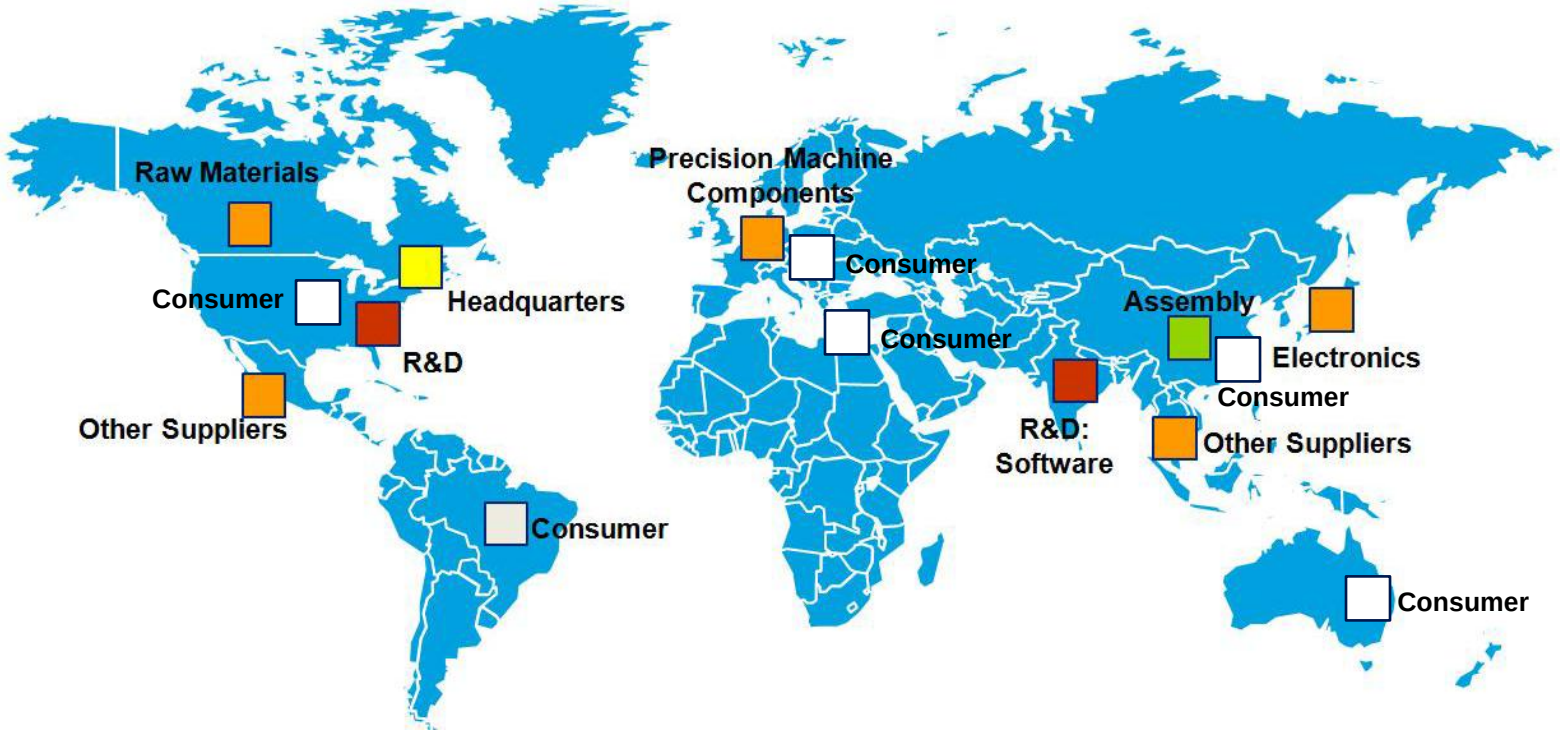
ROA Performance trends for Bottom Quartile of U.S. Manufacturing sectors (1965 – 2010)



Source: Deloitte analysis

Disaggregated Global Supply Chains

No longer is a product designed, produced and sold in a single country or even single region.

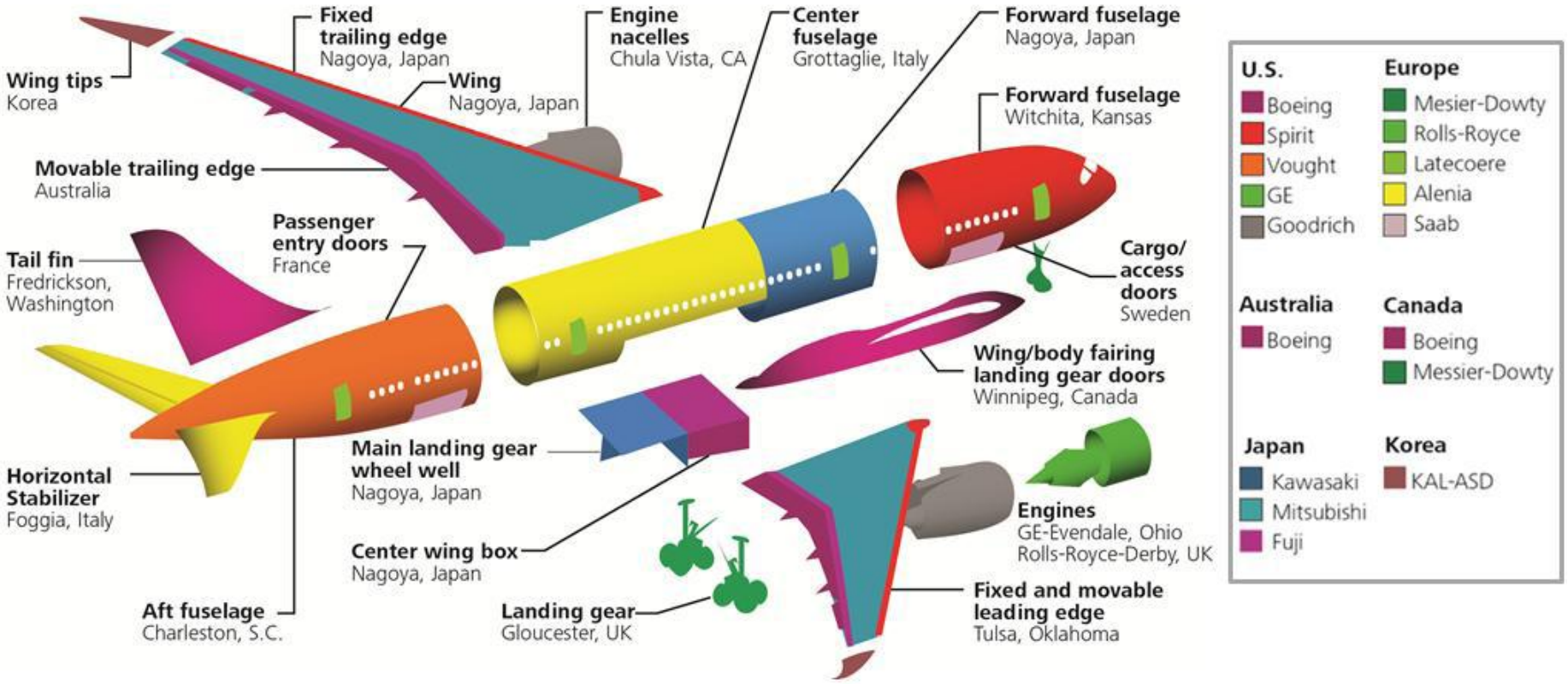


A company can procure materials at the lowest price in one location and ship them to a location with low labor rates, as engineers in yet another location make product design and manufacturing process decisions.

Manufacturing's Globalization

Global Disaggregation of Manufacturing Supply Chains

Boeing 787



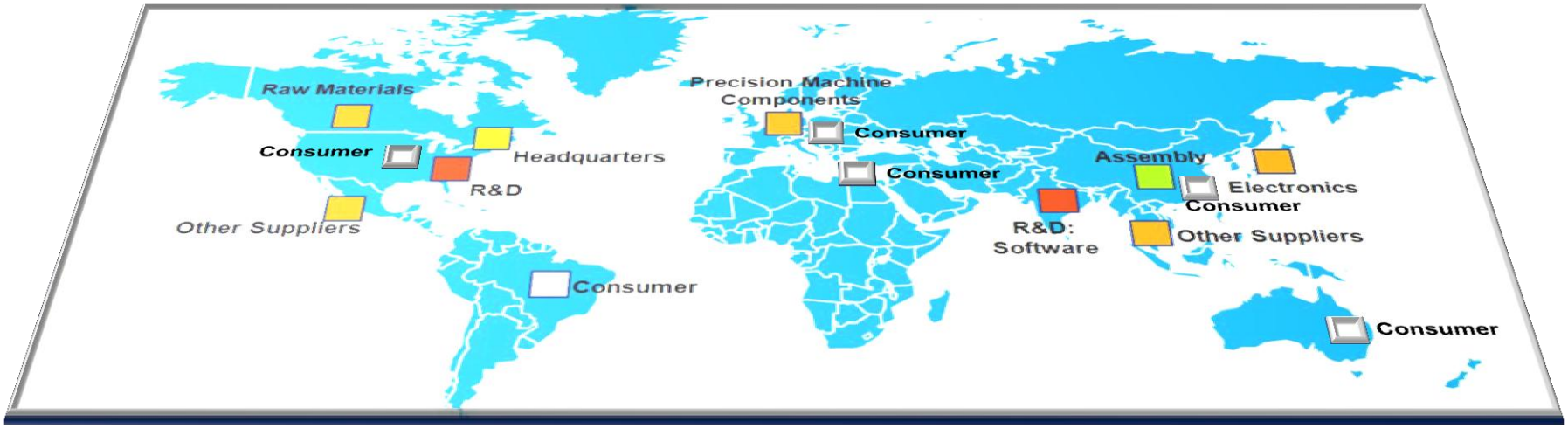
Source: Image Copyright of the Boeing Company. Source: http://bintang.site11.com/Boeing_787/Boeing787_files/Assembly.html

But global supply chains leave countries increasingly exposed……

Rising protectionist politics

Exposure to currency volatility

Fading labor rate arbitrage



……. And is giving rise to the new calculus of manufacturing

The Future of Manufacturing: Competition for resources, capabilities; and on public policy

As we look to the future, there are a number of key areas where both companies and countries will effectively share in the intensifying competition :

The **infrastructure** necessary to enable manufacturing to flourish and contribute to job growth will grow in importance

Competition to attract FDI will increase dramatically, raising the stakes for countries and complicating the decision processes for companies

Growing **materials resources competition** will serve as a catalyst to significant materials sciences breakthroughs

Affordable **clean energy strategies and effective energy policies** will be an important differentiator of highly competitive countries and companies

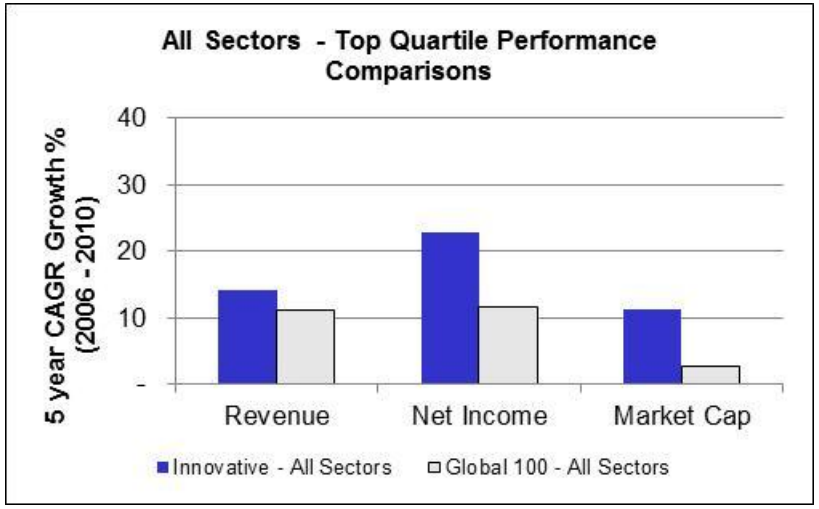
More innovative companies will earn better market share and improve profitability and countries more successful at **fostering innovation** will have greater GDP growth

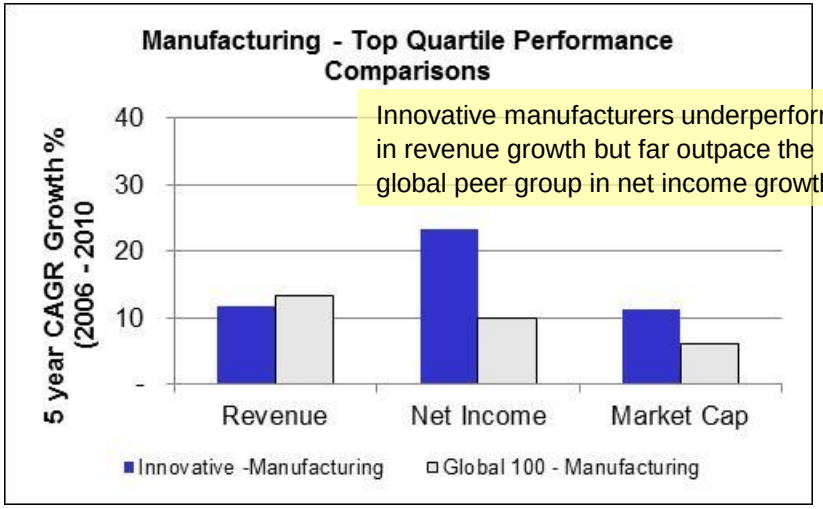
Companies are struggling to fill manufacturing jobs with the right talent and access to **human capital** will become more important

The strategic use of **public policy as an enabler** of economic development will place a premium on collaboration between policymakers and business leaders

The Future of Manufacturing:
Competition to innovate and foster innovation

Innovative companies outperform their peers in key performance indicators across all sectors including manufacturing.





Innovative manufacturers underperform in revenue growth but far outpace the global peer group in net income growth

Manufacturing sector includes: A&D, Automotive and Industrials

Analysis Overview

- Aligned the 100 Most Innovative* and Global 100 companies to peer groups by sector
- Calculated the top quartiles for each metric/sector peer group combination (metrics employed: five year growth rates for: revenue, net income and market cap)
- Plot quartiles for each metric/sector peer group combination
- Analysis showed that the innovative groups outperform their global 100 peers in all but one metric
    - For purposes of this analysis, innovative companies are defined as Forbes 2011 Most Innovative Companies list.

The ability to innovate, at an accelerated pace, will be the most important capability differentiating the success of countries and companies

Source: Deloitte. CAP IQ; Deloitte Analysis; The World's Most Innovative Companies. Forbes. Retrieved December 6, 2011 http://www.forbes.com

The Future of Manufacturing:
Competition to innovate and foster innovation

At a country level, direct R&D investment contributes to, but does not drive, national innovation success.

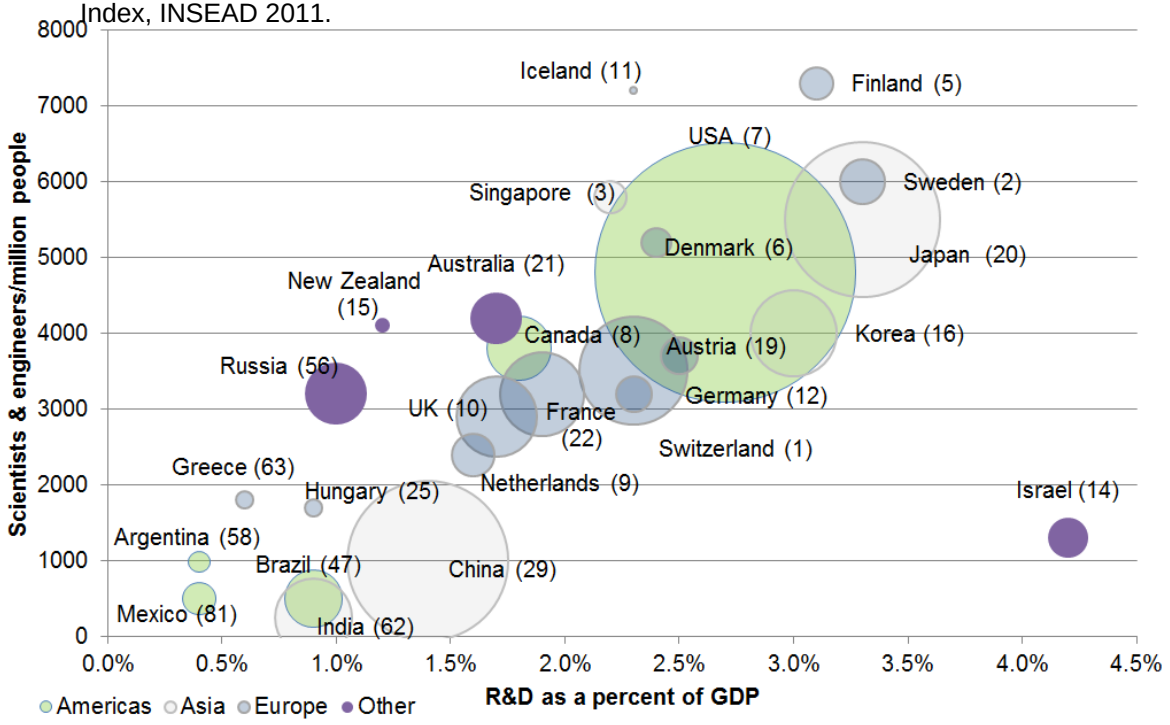
Global Innovation Rank

Rank	Country	R&D as % of GDP
1	Switzerland	2.3
2	Sweden	3.3
3	Singapore	2.2
4	Hong Kong	0.8
5	Finland	3.1
6	Denmark	1.6
7	US	2.7
8	Canada	1.8
9	Netherlands	1.7
10	UK	1.7
12	Germany	2.3
20	Japan	3.3
29	China	1.4
47	Brazil	0.9
62	India	0.9

(#) = Innovation Ranking

R&D Spend by Country 2010

The diameter of each circle represents the relative annual R&D spend by country. The number in the parentheses represents the innovation ranking on The Global Innovation Index, INSEAD 2011.



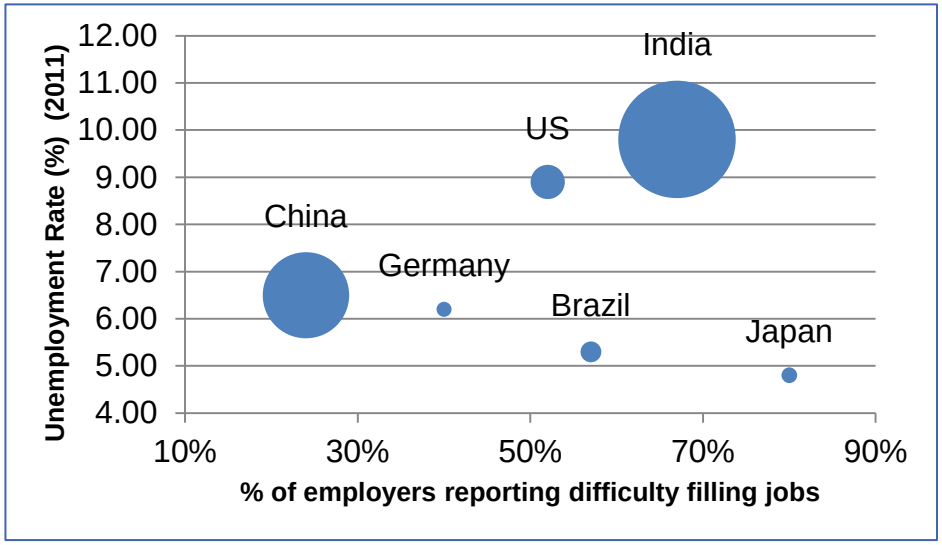
The ability to innovate, at an accelerated pace, will be the most important capability differentiating the success of countries and companies

Source: INSEAD. 2011. The Global Innovation Index 2011:Accelerating Growth and Development. 18-19; R&D Magazine. December 2010. Global R&D Funding Forecast. 4.

The Future of Manufacturing: Competition for talent and access to human capital

The global economic downturn may have masked the talent shortage but the labor shortages persists for key manufacturing jobs despite significant unemployment rates

Unfilled Manufacturing Jobs by Country 2011



Bubble Size Key: Number of Unfilled Jobs

Top 10 Jobs Employers Have Difficulty Filling (Globally)

Job	Rank				
	2007	2008	2009	2010	2011
Technicians	**3**	**3**	**3**	**3**	**1**
Sales Representatives	1	2	2	2	2
Skilled Trades Workers	**2**	**1**	**1**	**1**	**3**
Engineers	**4**	**4**	**4**	**4**	**4**
Laborers	6	6	7	10	5
Managers	9	5	5	8	6
Accounting/Finance	5	9	6	5	7
IT Staff	*	10	*	*	8
Production Operators	7	*	8	6	9
Administrative Staff	*	7	9	7	10

Talented human capital will be the most critical resource differentiating the prosperity of countries and companies

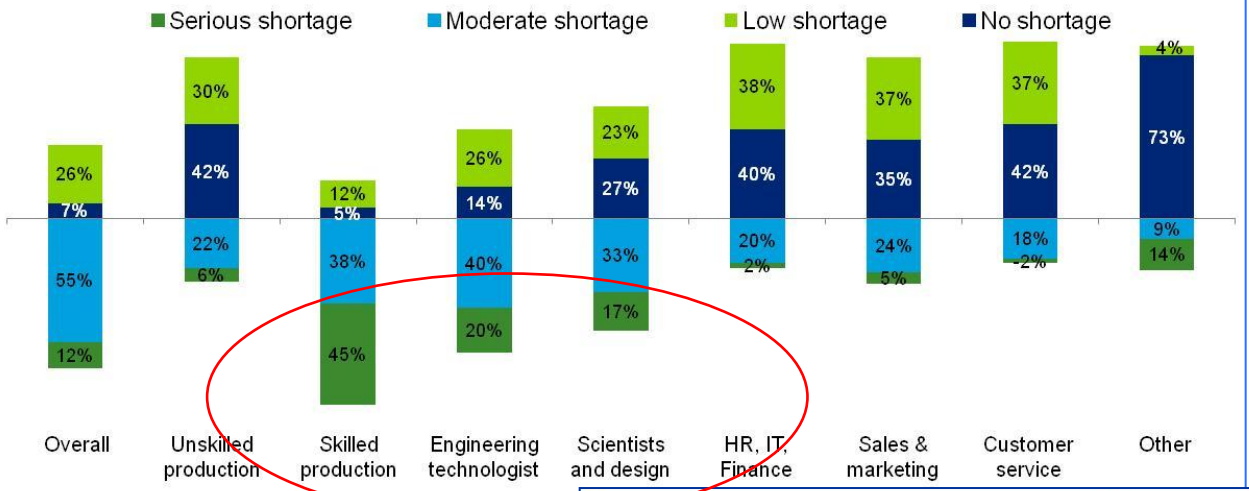
Source: Deloitte Analysis; The Economist Intelligence Unit; OECD; Businessweek; Latin American Herald Tribune; National Skill Development Corporation; The Manufacturing Institute; Manpower Group

2011 Skill's Gap in U.S. Manufacturing Report

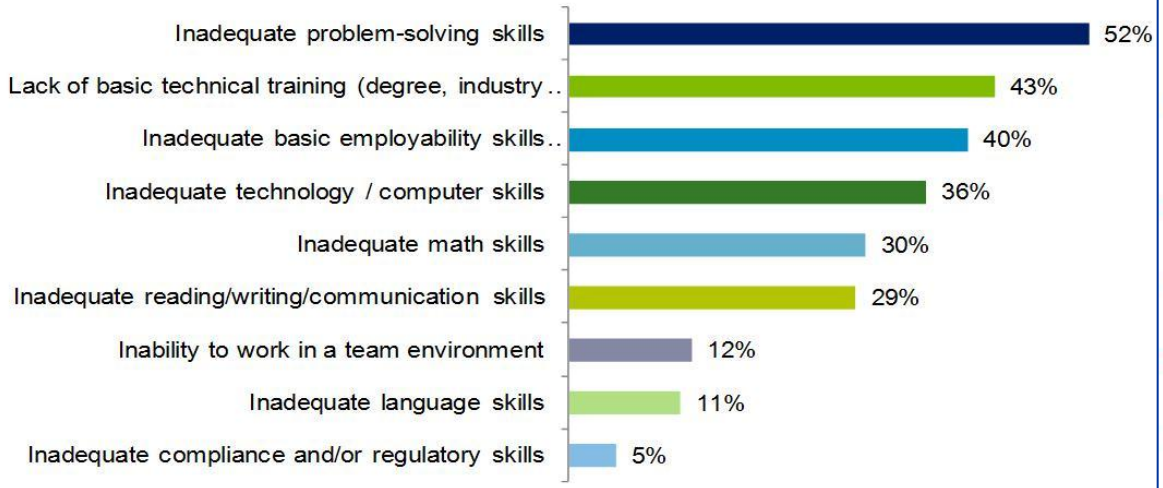
Deloitte. Manufacturing Institute

Boiling point?
The skills gap in U.S. manufacturing

Availability of qualified workers for the following workforce segments



What are the most serious skill deficiencies in your current employees?



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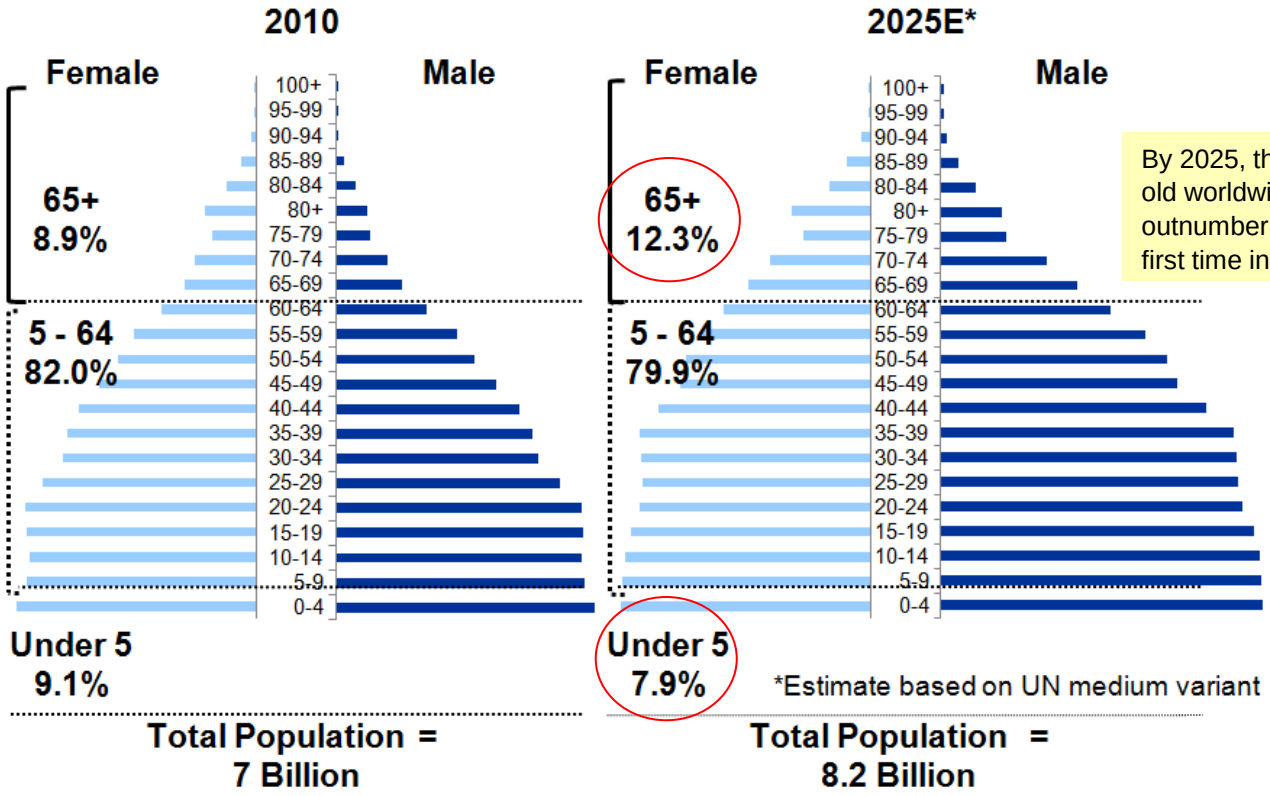
Drivers critical to success in next 3-5 yrs	Rank
High skilled, flexible workforce	1
New product innovation	2
Increased market share	3
Low cost producer status	4
Increased customer service orientation	5

The Future of Manufacturing: Competition for talent and access to human capital

The aging global population and retiring skilled workers will increase talent shortages.



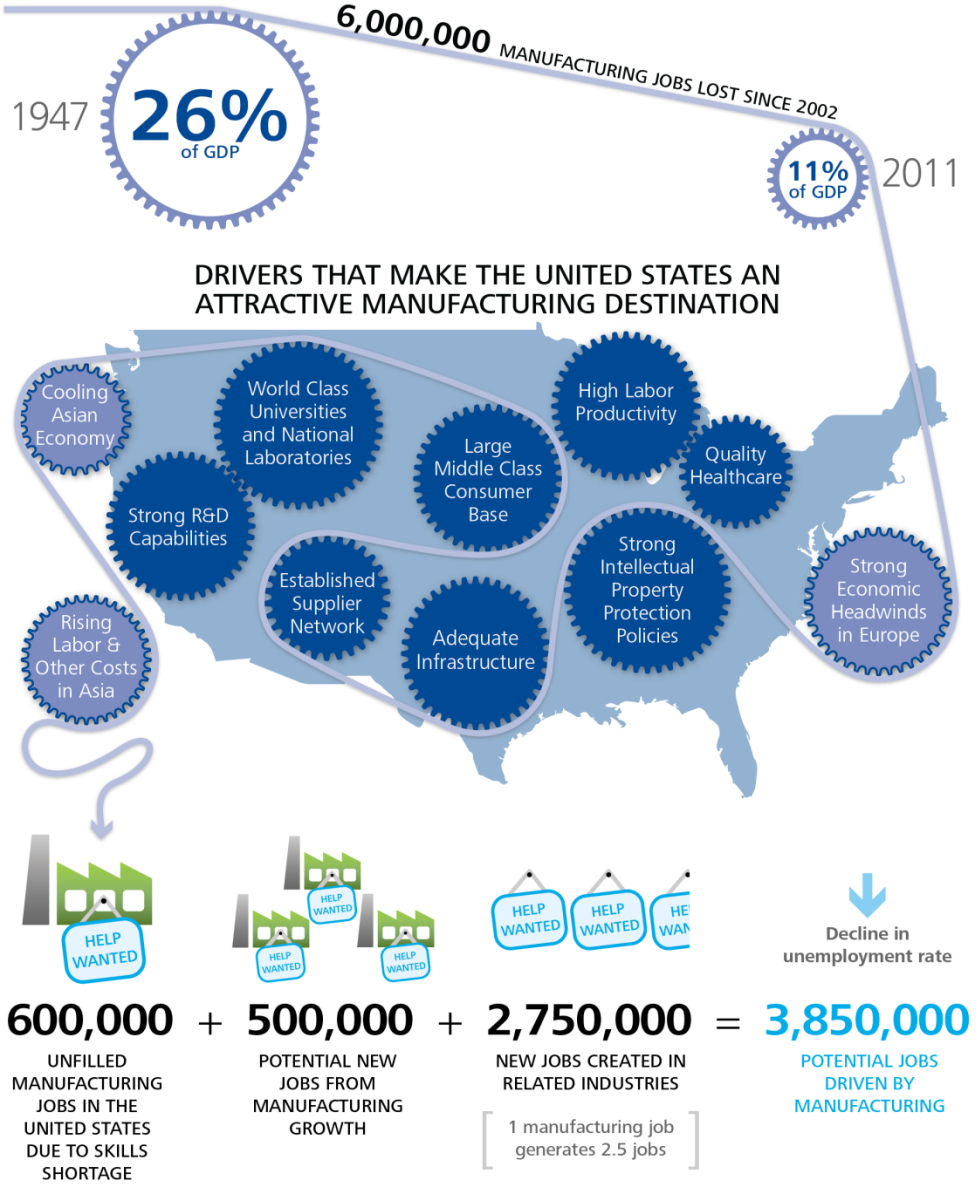
By 2025, those over 65 years old worldwide are expected to outnumber the young* for the first time in history

Talented human capital will be the most critical resource differentiating the prosperity of countries and companies

Source: Deloitte Analysis; NIA, NIH. (2007) Why Population Aging Matters; United Nations, Population Division. (2011) World Population Prospects, the 2010 Revision.

The Manufacturing Opportunity in the United States

The linkage between manufacturing capabilities and economic prosperity is a much stronger predictor of a vibrant, successful, and growing economy than any other measure typically used by economists.



Deloitte.

Sources:
Uday Karmarkar, "The Increase in U.S. Manufacturing Jobs Is Nothing to Cheer About," Harvard Business Review (January 20, 2011), http://blogs.hbr.org/cs/2011/01/why_the_increase_in_us_manufac.html.
http://www.themanufacturinginstitute.org/~/media/A07730B2A798437D98501E798C2E13AA.ashx
Deutsche Bank Group/DB Advisors, The Decline of U.S. Manufacturing: Fact or Fiction? (Frankfurt am Main, March 2011), p. 1, https://www.dbadvisors.com/content/_media/DAM466_CloserLook0311.pdf.
Economic Policy Institute, Updated Employment Multipliers for the U.S. Economy, by Josh Bivens (August 2003), http://www.epi.org/page/-/old/workingpapers/epi_wp_268.pdf.
U.S. Bureau of Labor and Statistics, Department of Labor, http://www.bls.gov/news.release/pdf/empsit.pdf.

The Future of Manufacturing: Competition for strategic use of public policy

Countries are increasingly employing more highly sophisticated and assertive techniques of industrial policy to drive economic growth.

The Economist

Picking winners, saving losers
Industrial policy is back in fashion. Have governments learned from past failures? August 5, 2010

Japan's prime minister, Naoto Kan, said in April (2010) that the government wanted to create a new "Japan Inc", deepening the links between business and the state. In June the Ministry of Economy, Trade and Industry (METI) announced a strategy to combat the "increasingly aggressive" industrial policies of America, Britain, China, France, Germany and South Korea…..

Like America, European countries have lavished money on banks and carmakers. The European Commission will unveil a new, active industrial strategy later this year, **which will pay more attention to manufacturing** and less to services and "knowledge" industries……..

"Industrial policy is no longer taboo," says Mario Monti, a former competition commissioner. "There's a revival of demand for it." France's government, having retreated from directing industry in recent years, launched a heavily interventionist policy in March, **vowing to lift manufacturing output by a quarter over five years……**

Inspired by the French, Britain's Labour government last year set up a Strategic Investment Fund to steer £750m ($1.2 billion) of state money to particular industries and companies. The Conservative-led coalition has since rejected what it calls a "new interventionism" around the world. It has cancelled some loans, such as one to Sheffield Forgemasters, a northern steel firm. But much of Labour's plan remains……..

….the World Bank, after decades of consensus that industrial policy doesn't work for developing nations, is now recommending its use. A recent paper by Justin Lin, the bank's chief economist, and a colleague, Célestin Monga, examines how governments can identify possibly successful policies and likely failures.

The Future of Manufacturing: Competition for resources, capabilities; and on public policy

As we look to the future, there are a number of key areas where both companies and countries will effectively share in the intensifying competition :

The **infrastructure** necessary to enable manufacturing to flourish and contribute to job growth will grow in importance

Competition to attract FDI will increase dramatically, raising the stakes for countries and complicating the decision processes for companies

Growing **materials resources competition** will serve as a catalyst to significant materials sciences breakthroughs

Affordable **clean energy strategies and effective energy policies** will be an important differentiator of highly competitive countries and companies

More innovative companies will earn better market share and improve profitability and countries more successful at **fostering innovation** will have greater GDP growth

Companies are struggling to fill manufacturing jobs with the right talent and access to **human capital** will become more important

The strategic use of **public policy as an enabler** of economic development will place a premium on collaboration between policymakers and business leaders

The Future of Manufacturing: Competition for resources, capabilities; and on public policy

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Rapid globalization and the quest for economic growth and prosperity has intensified the competition for both the resources and capabilities necessary for success.

vill

profitability and countries more successful at **fostering innovation** will have greater GDP growth

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